

3.3.6 MODEL CALIBRATION

For model calibration, the USIBWC provided Michael Baker with a hydrograph and rating table from Hurricane Beulah, and an IBWC-approved, 1-D calibrated HEC-RAS model about fourteen miles long, within the vicinity of Rio Grande City. The parameters refined, during the calibration, include inflow hydrographs, cross-section geometry, n-values used for 1-D modeling, land use and n-values for 2-D modeling, and modifications to the terrain to reflect elevations for the "International Road" leading to the Rio Grande City bridge on the Mexican side.

Hurricane Beulah occurred in the fall of 1967 and had been recorded at the USIBWC gage station 08464700, located at Rio Grande City, just 0.13 mile upstream from the Rio Grande City Bridge. The peak discharge of 220,000 cfs was recorded at midnight of September 22nd-23rd, as indicated in the 1970 Agreement between the US and MX, Minute 238 (Reference 26).

Figure 4 shows the hydrograph provided by USIBWC for model calibration. The calibration modeling would adhere to 220,000 cfs arriving at Rio Grande City, located 39 miles downstream of Falcon Dam. Because the 2-D model attenuates the flow, additional inflows are required at point locations upstream of Rio Grande City. Three inflows were determined upstream.

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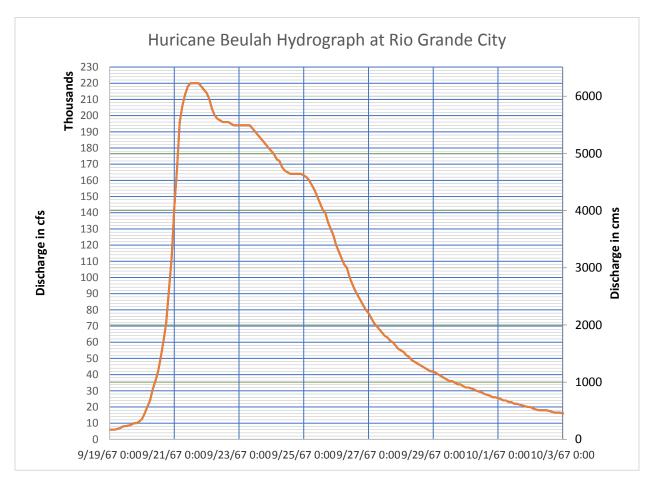


Figure 4. USIBWC-Provided Inflow Hydrograph for Hurricane Beulah at Rio Grande City in both Thousands of Cubic Feet per Second (cfs) and Cubic Meters per Second (cms)

The three inflows were based on a document entitled *Floods of September-October 1967 in South Texas and Northeastern Mexico Geological Survey Water-Supply Paper 188-B* by the United States Geological Survey (USGS) (Reference 27). According to the document, peak flows of 86,500 cfs were reached at Ciudad Mier (Rio Alamo confluence, 27 miles upstream of the Rio Grande City gage station) and 166,000 cfs at Ciudad Camargo (Rio San Juan confluence, 4 miles upstream of the Rio Grande City gage station), and only 18 cfs was flowing from Falcon Dam (39 miles upstream of the Rio Grande City gage station). To develop the inflow hydrographs, the peak flows for Ciudad Mier and Ciudad Camargo were translated to hydrographs of the same shape as the USIBWC-provided hydrograph. The hydrograph applied at Falcon Dam is an adjusted quasi-steady state hydrograph with a peak flow of 36,000 cfs to reach a flow of 220,000 cfs at Rio Grande City. This hydrograph represents the hydrology of the reach between Falcon Dam and the Rio Alamo confluence and was used to match the discharge at Rio Grande City. See Figure 5 for the resulting hydrographs. See Table 12 for the final calibration peak discharge rates applied, their geographical locations, the associated cross-section where the flows are applied, and the state of the flow rate applied.

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Geographical Location	Location with Respect to Rio Grande City Gage Station	HEC-RAS Cross- Section Station ID	Calibration Peak Discharge Rate (cfs)	State of Hydrograph
Ciudad Mier, Rio Alamo	27 Miles Upstream	412349	86,500	Unsteady
Ciudad Camargo, Rio San Juan	4 Miles Upstream	285435	166,000	Unsteady
Falcon Dam Outlet	39 Miles Upstream	477257.8	36,000	Quasi-Steady

Table 12: 2-D Model Calibration Flows

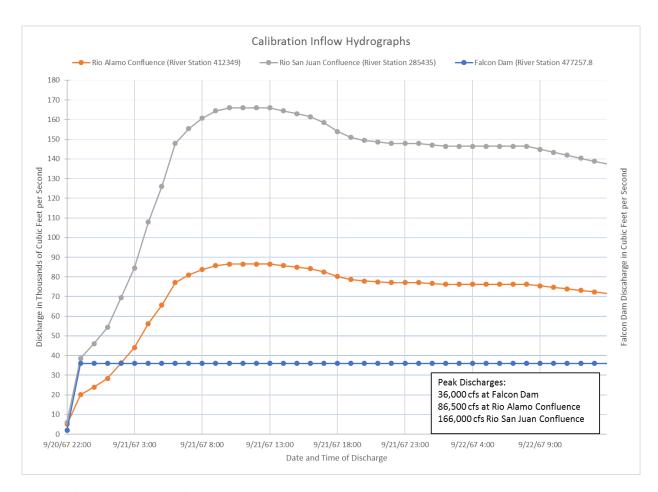


Figure 5: Inflow Hydrographs for 2-D Calibration Model. Falcon Dam Discharges Plotted Using Secondary-Axis

In addition to calibrating the flows, 1-D cross-section geometry and the model n-values were calibrated to the measured WSE at the gaging station at Rio Grande City. To facilitate this, the calibrated 1-D model at Rio Grande City, provided by USIBWC, serves as the basis of the 1-D channel modeling herein, where the models are coincident. The 1-D hydraulic model at Rio Grande City is associated with the *Rio Grande Hydraulic Modeling Final*

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Report for the Rio Grande City/Ciudad Camargo Reach, dated November 2017 by Stantec for USIBWC (Reference 28).

The calibrated 1-D model employs surveyed cross-sections that span the Rio Grande floodplain. The model covers six river miles upstream of the Rio Grande City Bridge to five river miles downstream of it. Using accepted, calculated bathymetry, blocked obstructions, ineffective flow areas, and slightly higher n-values throughout the reach, this model meets a WSE of 0.81-ft below the WSE rating curve for this discharge, shown in Figure 6, at the Rio Grande City gage station for Hurricane Beulah. In response to the calibrated model, the 1-D model's channel geometry and the 2-D model's terrain were modified to generate an acceptable WSE at Rio Grande City.

Modifications to the model occur between river stations 296261.2 and 232404.6, where the two models are coincident. Modifications to the 1-D model's channel geometry included adding ineffective flow areas to the overbanks where ponding is likely to occur. The 2-D model's terrain was modified to reflect the elevations of the International Road connecting to Rio Grande City on the Mexican side. This was done by using an internal 2-D connection, and revising the elevations along the roadway to match ineffective flow areas in the calibrated USIBWC model. Changes to the roughness coefficients were made based on the calibrated model and are discussed in the following section.

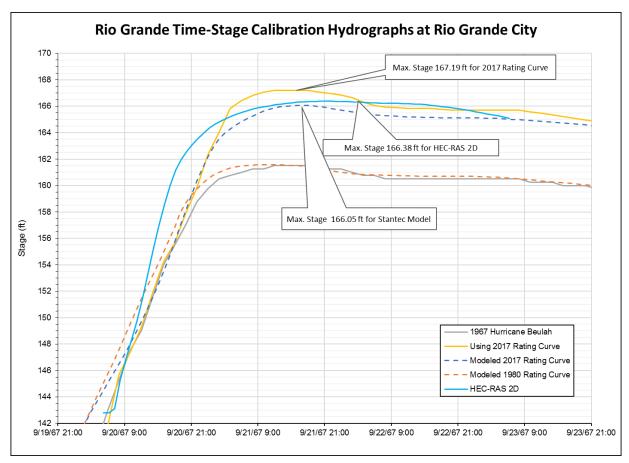


Figure 6: Time-Stage Calibration Hydrographs used for model calibration.

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Using the peak discharge recorded, and a rating table developed by USIBWC in 2017, Hurricane Beulah had a WSE corresponding to 167.19 ft. The USIBWC calibrated model has a WSE corresponding to 166.38 ft. The 2-D model results in a WSE corresponding to 166.05 ft. This WSE at the gage corresponds to two flow rates that total 223,940 cfs: one of 86,206 cfs, reported by the Bridge station 265371 BR at model time 22Sep1967 1400; and another of 137,744 cfs over the storage area connection at the International Road at the same time, just downstream from the gage station. The flow measurement was made at these alternative locations with the assumption of flow continuity. Particle tracking lines, shown in Figure 7, illustrate that flow distributions near the Rio Grande City gage station are turbulent at the moment of the peak discharge.

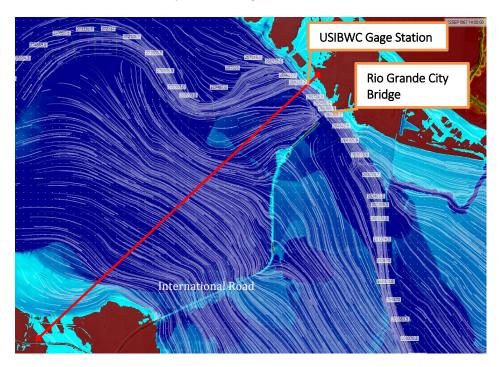


Figure 7: Rio Grande City particle tracking and Floodplain Cross-Section at Gage Station

3.3.7 ROUGHNESS COEFFICIENTS

For the 1-D channel, the Manning's n-values applied were calibrated to be 0.1 - 0.2 for the overbanks and 0.075 for the main channel. These values are higher than typical land-use designated n-values, shown below, but are consistent with the roughness coefficients used in the USIBWC calibrated models.

The land use database was developed using a combination of open-source, land use Geographic Informational Systems (GIS) datasets downloaded from the United States Geological Service (USGS) and Instituto Nacional de Estadistica y Geografia (INEGI) data webservices. The Rio Grande main channel was delineated as a shapefile and incorporated as part the land use/n-value designations. The USGS provides access to the National Land Cover Database (NLCD) 2011 (Reference 29). This database has GIS layers representing the different land uses in the US, and the data contains land use descriptions that can be used to assign roughness coefficients. This data only covers

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the north floodplain of the Rio Grande. The webservice for INEGI also provides GIS layers with descriptions of land use in MX (Reference 30). The land use in this layer was matched with NLCD data to make equivalent land use descriptions. The layers from NLCD and INEGI overlapped on a few areas over the Rio Grande, but the Rio Grande main channel delineation was overlaid and used as an additional land use type. See Table 13 for the land use and associated n-values applied after the calibration for the 2-D areas. Final n-values were determined based on the model calibration described in the previous section, and fall within the n-values reported in the *Rio Grande Hydraulic Modeling Final Report for the Rio Grande City/Ciudad Camargo Reach* by Stantec (Reference 28).

Land Use Description	n-value	Land Use Description	n-value
Rio Grande	0.050	Evergreen Forest	0.100
Open Water	0.050	Mixed Forest	0.120
Developed, Open Space	0.030	Shrub/Scrub	0.100
Developed, Low Intensity	0.068	Herbaceous	0.070
Developed, Medium Intensity	0.068	Hay/Pasture	0.050
Developed, High Intensity	0.040	Cultivated Crops	0.050
Barren Land (Bare Ground)	0.030	Woody Wetlands	0.200
Deciduous Forest	0.080	Emergent Herbaceous Wetlands	0.060

Table 13: Manning's n-Values and Associated Land Uses for 2-D Areas

3.3.8 DESIGN FLOWS AND EXISTING CONDITIONS

The 2-D model between Falcon Dam and Rio Grande City is required to produce a design discharge of 250,000 cfs at Rio Grande City, as indicated in Minute 238. The hydrologic inflows used for design were placed at the same locations as the calibration flows. That is, an upstream boundary condition using a quasi-steady state hydrograph was entered at the mouth just downstream of Falcon Dam. And, two lateral unsteady inflow hydrographs were entered to represent inflows from Rio San Juan and Rio Alamo. As discovered during the calibration, inflows are required to mitigate the attenuation of the flows from the mouth of the dam to Rio Grande City, 39 river miles downstream from the dam.

The peak discharge rate for Falcon Dam was based on stream gage 08-4613.00 (Reference 31), published by the USIBWC, located below Falcon Dam. Records indicate two major events, one in 1971 for 76,280 cfs and one in 2010 for 68,157 cfs were identified as outliers in the Bulletin 17B Analysis, based on the gage data as shown in Figure 8. The design event would be considered a multi-day event, and hence be represented by a steady inflow boundary condition at the head of the model. A design discharge of 80,000 cfs was assumed as the design event representative of Falcon Dam's release operations, in addition to the cumulative discharges generated from the tributaries in the reach upstream of the Rio Alamo confluence.

For the Rio Alamo Confluence Discharge, the flow was kept the same as reported for Hurricane Beulah, using the same shape for calibration.

For Rio San Juan, the inflow hydrograph was adjusted to account for the flow attenuation in the River and to match the design flow at Rio Grande. An inflow hydrograph of 152,000 cfs results in a generated peak of about

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249,000 cfs at Rio Grande City corresponding to two flow rates: one of 85,925 cfs, reported by the Bridge station 265371 BR at model time 22Sep1967 1500; and another of 16,3042 cfs over the storage area connection at the International Road at the same time, just downstream from the gage station. See Table 14 and Figure 9.

Table 14: Design Inflows for RGV- 63

Geographical Location	Location with Respect to Rio Grande City Gage Station	HEC-RAS Cross- Section Station ID	Design Peak Discharge Rate (cfs)	State of Hydrograph
Ciudad Mier, Rio	27 Miles	412349	86,500	Unsteady
Alamo	Upstream			
Ciudad Camargo,	4 Miles	285435	152,000	Unsteady
Rio San Juan	Upstream			
Falcon Dam Outlet	39 Miles	477257.8	80,000	Quasi-Steady
	Upstream			

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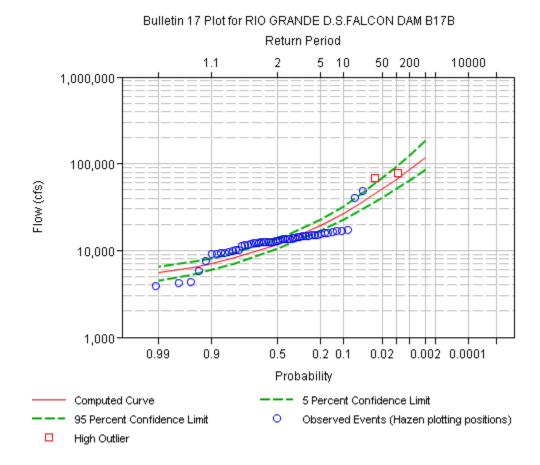


Figure 8: Bulletin 17B Flood Frequency Analysis for Rio Grande below Falcon Dam

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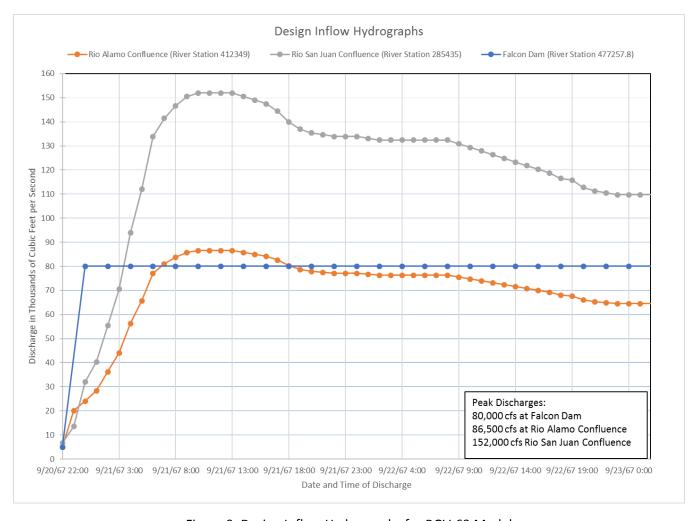


Figure 9: Design Inflow Hydrographs for RGV-63 Model

3.3.9 PROPOSED WALL MODELING

A type P-3 bollard wall with an anti-climb plate is proposed for the 63-mile and modeled using HEC-RAS. The bollard wall consists of a typical configuration of 6-inch square steel bollards set on the diagonal with a 4-inch clearance between bollards, as shown in Figure 10. To meet the required drainage criteria, the steel bollards may be rotated 45-degrees with 5-inch clearance. More details about the proposed construction are provided in the draft construction drawings provided in Attachment C.

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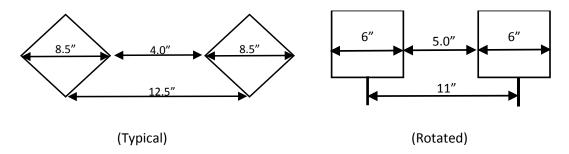


Figure 10: Steel Bollard Configuration (not to scale)

The obstruction factor due to debris is evaluated using an obstruction factor of 35%. For the proposed condition to account for debris in the model the clear space is reduced by 35% and that distance is added to the bollard width, while the centerline to centerline spacing stays the same. In the typical configuration, the open space becomes 2.6-inches and the bollard width becomes 9.9-inches (increased from 8.5-inches). In the low water crossing (rotated) configuration, the open space is reduced to 3.25-inches and the bollard width becomes 7.75-inches (increased from 6-inches). Refer to Figure 11. The multiplication factor is used to generate the open space in the 2-D storage area connection profile.

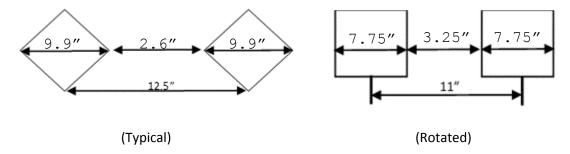


Figure 11: Steel Bollard Clear Space Adjustment (not to scale)

The proposed 63-mile wall along the Rio Grande's floodplain is modeled using internal 2-D storage area connections within the north storage area (2-D mesh) HEC-RAS component. Internal 2-D area connections are converted from breaklines (described in section 3.3.2) and allow quantification of overland flow discharges across the 2-D storage area connection (based on the weir equation) within a single 2-D mesh at the ground elevation or at user-defined elevations. For the proposed wall, the connection elevation profile is modified to reflect the bollard wall of specific geometries, shown in Figure 12.

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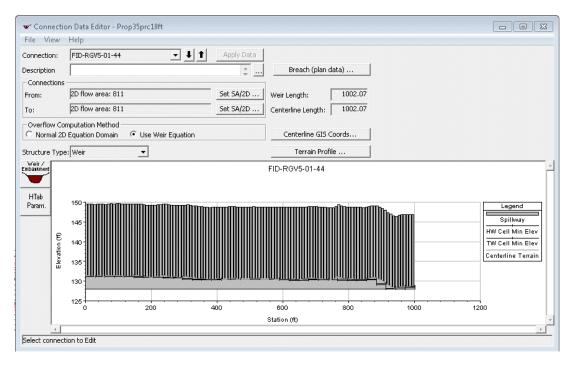


Figure 12: Typical 2-D Storage Connection Profile

The stations and elevations in the 2-D storage area connection, representing the wall, are processed to generate the stations and elevations of an 18-ft tall bollard wall on the existing ground, using a multiplier ranging with a factor of 8 - 9 to represent the bollard spacing and thickness. In some cases, where the wall alignment was close to the 1-D component boundary, additional modifications, such as increasing multiplier factors, reducing weir coefficients, and complete blocking, were applied to achieve stable solutions. The weir coefficient used in most cases to represent the wall was a value of 3.1 representing sharp crested weirs. In some cases, the weir was reduced to 1.0 for areas where the weir solver was unstable. Similarly, the multiplier factor was increased iteratively for those 2-D storage area connections that presented numerical instabilities. Some connections used factors as high as 50 to represent the bollards. Table B1 in Attachment B provides a list of the 2-D storage area connections and the factors, configuration types and weir coefficients used in the model. Figure A8 shows the proposed alignment configuration for the RGV 63-Miles comparing openings, rotated and typical configurations. The wall segments names modeled were inherited from the original alignment provided by CBP and its last number indicates the number of partitions of the original segment. Most importantly, these names are not directly related to project identifications.

The bollard wall 2-D storage area connections are composed of approximately 1,000-ft to 1,500-ft segments to accommodate the 500 stations and elevation data point limitations within HEC-RAS. The bollard wall is represented as an impediment to flow in the proposed condition, and the impact is measured as described in the next section.

Due to numerical stability conditions, run time lengths and other factors in the proposed conditions model, the existing conditions model and proposed conditions model were initiated using simulation restart files.

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3.4.0 IMPACTS

The impacts for the proposed wall were compared with the USIBWC criteria. This section discusses the criteria and the methodology used to calculate the impacts.

3.4.1 USIBWC CRITERIA: DEFLECTION CALCULATIONS AND WATER SURFACE ELEVATION IMPACTS

Hydraulic impacts for 1-D models are defined by increases in the WSE and deflection of flow from the north overbank to the south overbank. The hydraulic impacts due to WSE increases are calculated as the proposed WSE minus the existing WSE. The hydraulic impacts due to increases in deflection of flows are calculated using the HEC-RAS variables 'Q Left,' 'Q Channel,' and 'Q Right,' per USIBWC guidance. These variables represent, respectively, flow in the left overbank, flow in the main channel, and flow in the right overbank. For each 1-D cross-section, the discharge on the QMX is calculated as half the flow in the main channel plus the flow in the main channel plus the flow in the main channel plus the flow in the left overbank.

This 2-D model can be analyzed for impacts in an equivalent manner described above using profile cross-sections within RAS Mapper. As mentioned in the previous paragraph, 1-D model cross-sections are composed of flows within the left overbank, the channel, and the right overbank; and the flow through each of those segments is processed separately to determine the deflection. For 2-D models, the flow within these areas can be estimated using profile cross-sections; the cross-sections are placed within the left and right overbanks of the 1-D models, as shown in Figure A9 in Attachment A. They can be processed similarly to quantify the deflection, using the maximum peak discharge, and placed at locations of interest. The profile cross-sections are drawn through the left and right 2-D mesh as extensions of prescribed 1-D cross-sections, spaced one to two miles apart. Because of the flow variations throughout the reach, these sections are drawn perpendicular to the floodplain general flow direction. No new cross-sections within the 1-D channel are added.

Prescribed cross-section locations will be spaced out with a maximum 2-mile range, except for large urban areas where the prescribed locations will be closer together. Prescribed locations are identified as urban or rural. A figure of the cross-section locations for impact calculations will be submitted for review. Additional impact calculation locations may be added later.

WSEs can be compared by developing maximum WSE rasters using the HEC-RAS mapper tools. These resulting rasters can be subtracted from those used in ArcGIS tools and develop a raster of the difference. This new raster represents the difference in maximum WSE of the existing and proposed conditions, which identify regions or clusters of changes in units of ft, that are the result of the impacts of the proposed wall.

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The established thresholds as per USIBWC coordination for 1-D models are:

Water Surface Elevation Increase Thresholds: Maximum 3-inches (0.25-ft) in urban areas and 6-inches (0.5-ft) in rural areas.

Percent Flow Deflection Threshold: 5% increase of allowable deflection (+5%).

3.4.2 DEFLECTION IMPACTS

Figure A9 showing the cross-sections used to calculate deflection parameters is provided in Attachment A. The deflection calculations are shown in Table 15. The deflection values range from -12.59% to 1.84% in the US and from -6.04% to 2.62% in MX, all under the USIBWC +5% criteria.

Table 15: Deflection Impact Calculations

	Proposed	Condition	Existing (Condition	Defle	ection	Percent Do	eflection
River	QUS	QMX	QUS		US	MX	US	МХ
Station	(cfs)	(cfs)	(cfs)	QMX (cfs)	(cfs)	(cfs)		
474302.7	41828	38161	42445	37589	-617	572	-1.45%	1.52%
470116.3	43493	37580	43872	37219	-380	361	-0.87%	0.97%
464710.5	39113	40863	39114	40870	-1	-6	0.00%	-0.01%
459276.8	44306	35966	44305	35969	1	-2	0.00%	-0.01%
454353.3	37543	42336	37565	42338	-21	-2	-0.06%	0.00%
448923.3	44256	36395	44504	36182	-248	213	-0.56%	0.59%
443496.9	46544	33508	46963	33114	-419	394	-0.89%	1.19%
437488.6	44874	35623	45072	35411	-198	212	-0.44%	0.60%
432162.6	39121	41569	39156	41582	-35	-13	-0.09%	-0.03%
424255.2	50983	31043	50768	30958	215	85	0.42%	0.27%
420635.1	40135	39324	40362	38661	-227	663	-0.56%	1.72%
417188.8	42388	36349	42643	35875	-256	474	-0.60%	1.32%
411758.4	69023	74381	70065	75038	-1042	-657	-1.49%	-0.88%
408651.4	51787	104394	52550	105926	-763	-1532	-1.45%	-1.45%
401493.3	72269	85915	71503	87211	766	-1296	1.07%	-1.49%
398599.3	113340	58159	115092	58943	-1752	-784	-1.52%	-1.33%
388386.7	99720	57606	100979	58117	-1260	-511	-1.25%	-0.88%
384038.6	54505	102456	55048	103743	-543	-1286	-0.99%	-1.24%
379386.4	44888	110438	45495	111619	-606	-1182	-1.33%	-1.06%
375184.5	51547	90786	54671	90105	-3124	681	-5.71%	0.76%
368476.6	96564	62612	100351	61013	-3786	1599	-3.77%	2.62%
361927.6	71635	80350	72766	79439	-1131	911	-1.55%	1.15%
359534.6	66181	88002	64987	87631	1194	371	1.84%	0.42%

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	Proposed	Condition	Existing (Condition	Defle	ection	Percent De	eflection
	QUS	QMX	QUS		US	MX		
River Station	(cfs)	(cfs)	(cfs)	QMX (cfs)	(cfs)	(cfs)	US	MX
354116.3	44706	109461	46252	110216	-1546	-755	-3.34%	-0.68%
348708.7	71537	83013	73547	83448	-2010	-435	-2.73%	-0.52%
343297.7	146229	45922	149203	46218	-2974	-296	-1.99%	-0.64%
336118.1	190334	28589	193808	28961	-3475	-372	-1.79%	-1.28%
328321.7	103744	68180	105872	68793	-2128	-613	-2.01%	-0.89%
323177.6	49917	101143	51008	102336	-1091	-1193	-2.14%	-1.17%
316816.5	130794	49326	132384	49931	-1591	-605	-1.20%	-1.21%
311418.8	107927	69314	109353	70138	-1426	-824	-1.30%	-1.17%
305368.3	55250	91444	56348	92165	-1098	-721	-1.95%	-0.78%
301894.8	67079	81420	68189	81534	-1110	-113	-1.63%	-0.14%
296261.2	57819	88032	59174	89383	-1355	-1351	-2.29%	-1.51%
291447.7	50628	98833	52682	100281	-2054	-1448	-3.90%	-1.44%
287845.2	46878	102133	50371	104565	-3493	-2432	-6.93%	-2.33%
279971.8	142815	130932	148359	134378	-5543	-3446	-3.74%	-2.56%
274569.8	111744	163721	116885	168378	-5142	-4657	-4.40%	-2.77%
269096.8	86768	212186	91580	219629	-4812	-7443	-5.25%	-3.39%
265259.3	47994	215515	48057	222922	-63	-7407	-0.13%	-3.32%
258863.9	119747	186184	125324	192687	-5577	-6503	-4.45%	-3.37%
253445.8	124778	142001	130998	147034	-6220	-5032	-4.75%	-3.42%
248004	207961	100812	214426	105768	-6465	-4956	-3.02%	-4.69%
243176.8	150760	159004	154803	163896	-4044	-4892	-2.61%	-2.98%
237789.1	69259	205211	79236	206712	-9977	-1500	-12.59%	-0.73%
232404.6	111672	175224	121118	177334	-9446	-2110	-7.80%	-1.19%
206394.8	210774	90554	221158	92557	-10384	-2003	-4.70%	-2.16%
200943.2	168548	107064	179586	108671	-11038	-1607	-6.15%	-1.48%
174320.4	248392	41738	259461	43381	-11069	-1643	-4.27%	-3.79%
169479.8	218095	53382	229165	55228	-11070	-1846	-4.83%	-3.34%
163953.8	248459	49109	260401	50547	-11941	-1439	-4.59%	-2.85%
153236.2	337938	31315	351876	32133	-13938	-818	-3.96%	-2.55%
147834.4	262839	61199	275428	62579	-12589	-1380	-4.57%	-2.21%
142419.3	218576	114293	230374	116597	-11798	-2303	-5.12%	-1.98%
132212.6	144014	157201	155686	160254	-11672	-3053	-7.50%	-1.91%
123809.5	81800	187906	90854	192770	-9054	-4864	-9.97%	-2.52%
121371.1	73565	192941	83090	197462	-9525	-4521	-11.46%	-2.29%
116547.7	66511	202724	75230	207909	-8719	-5186	-11.59%	-2.49%
111156.6	113667	177527	123691	181866	-10023	-4339	-8.10%	-2.39%

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	Proposed	oposed Condition Existing Con		Condition	Defle	ection	Percent Deflection	
River	QUS	QMX	QUS		US	MX		
Station	(cfs)	(cfs)	(cfs)	QMX (cfs)	(cfs)	(cfs)	US	MX
105978	99434	181986	110591	184682	-11157	-2696	-10.09%	-1.46%
100704.1	88408	204465	98692	208861	-10284	-4396	-10.42%	-2.10%
95473.03	127294	198448	135596	205545	-8302	-7097	-6.12%	-3.45%
90050.02	85675	204718	95065	213680	-9390	-8962	-9.88%	-4.19%
68438.08	63529	205119	66406	217098	-2877	-11978	-4.33%	-5.52%
50388.52	115874	152987	121013	162829	-5139	-9843	-4.25%	-6.04%
47327.57	119197	154149	125206	163077	-6009	-8928	-4.80%	-5.47%
42570.44	191920	130163	201427	138043	-9508	-7879	-4.72%	-5.71%
37205.68	190166	115718	199043	123135	-8876	-7418	-4.46%	-6.02%
31770.64	165331	125152	173356	132843	-8025	-7690	-4.63%	-5.79%
16221.11	97158	168516	102237	178221	-5079	-9705	-4.97%	-5.45%
10825.22	66289	200336	69937	211531	-3648	-11194	-5.22%	-5.29%
3307.529	47084	227428	49370	240276	-2285	-12847	-4.63%	-5.35%
585.7317	18530	247835	19810	261387	-1280	-13552	-6.46%	-5.18%

Red Font – Locations with highest changes in values

3.4.3 WATER SURFACE ELEVATION IMPACTS

WSE impacts are presented in Figure A10 provided in Attachment B. This map shows very small areas where the impacts exceed the USIBWC established threshold, but they are not showing significant impacts on the overall floodplain area. Figure A9 in Attachment shows that the proposed fence alignment meets USIBWC established criteria.

3.5.0 CONCLUSION

The proposed bollard wall, within the project parameters, will be designed to meet USIBWC deflection and WSE criterion. In addition, the proposed wall will not impact floodplain limits.

Page | 3-18 May 2018



4.0 SECTION 4: REFERENCES

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- 2) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0350C effective April 19, 2010 of Starr County, Texas.
- 3) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0375C effective April 19, 2010 of Starr County, Texas.
- 4) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0525C effective April 19, 2010 of Starr County, Texas.
- 5) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0520C effective April 19, 2010 of Starr County, Texas.
- 6) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0540C effective April 19, 2010 of Starr County, Texas.
- 7) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0550C effective April 19, 2010 of Starr County, Texas.
- 8) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0675C effective April 19, 2010 of Starr County, Texas.
- 9) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0680C effective April 19, 2010 of Starr County, Texas.
- 10) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0565C effective April 19, 2010 of Starr County, Texas.
- 11) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0685C effective April 19, 2010 of Starr County, Texas.
- 12) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0725C effective April 19, 2010 of Starr County, Texas.
- 13) National Flood Insurance Program Flood Insurance Rate Map Panel Number 48427C0750C effective April 19, 2010 of Starr County, Texas.
- 14) National Flood Insurance Program Flood Insurance Rate Map Panel Number 4803340375B effective January 2, 1981 of Hidalgo County, Texas.
- 15) National Flood Insurance Program Flood Insurance Rate Map Panel Number 4803340400C effective November 16, 1982 of Hidalgo County, Texas.
- 16) National Flood Insurance Program Flood Insurance Rate Map Panel Number 4803340475B effective January 2, 1981 of Hidalgo County, Texas.

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- 17) National Flood Insurance Program Flood Insurance Rate Map Panel Number 4803340500B effective January 2, 1981 of Hidalgo County, Texas.
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- 20) Hydrologic Engineering Center River Analysis System (HEC-RAS) Version 5.0.3, US Army Corps of Engineers, September 2016.
- 21) ESRIArcMap 10.4.1.5686 ArcDesktop 10.4.1 ESRI Inc., Copyright © 1999-2015.
- 22) Hydrologic Engineering Center HEC-GeoRAS Version 10.1, US Army Corps of Engineers, February 2013.
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- 25) HEC-RAS Hydraulic Model Update and Validation and FLO-2D Simulation for the Lower Rio Grande Flood Control Project (LRGFCP) Penitas to River Mile 28 and Off-River Floodways in Texas and Mexico prepared for USIBWC by S&B Infrastructure Limited, Contract Number IBM05D0001, July, 2008.
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- 27) Floods of September-October 1967 in South Texas and Northeastern Mexico. Geological Survey Water Supply Paper 1880-B. United States Department of The Interior, Geological Survey.
- 28) Rio Grande Hydraulic Modeling Final Report for the Rio Grande City/Ciudad Camargo Reach. Stantec for USIBWC, Contract No. IBM15D0002, Task Order 16-15 (IBM16T0020). November 2017.
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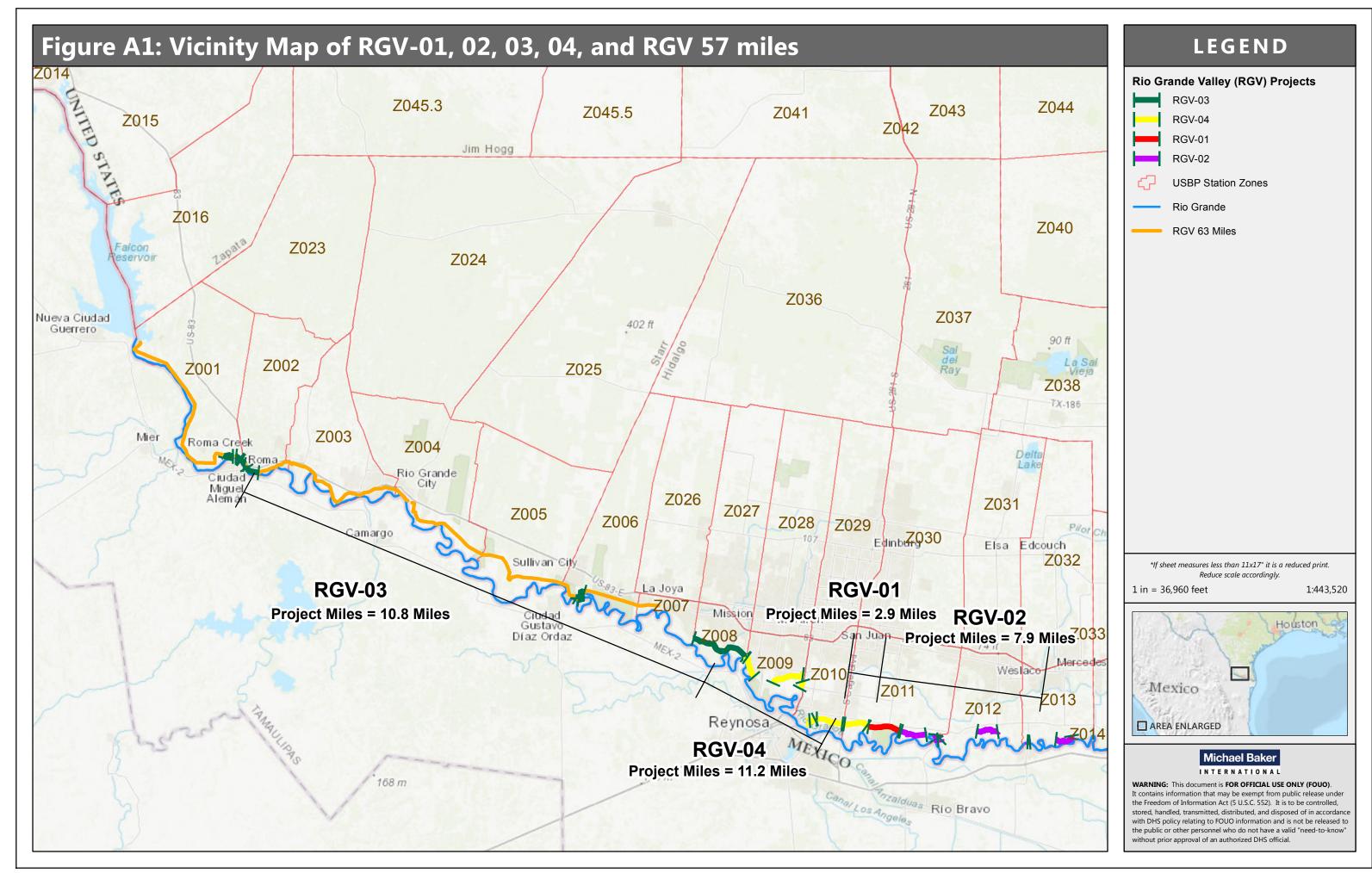
Page | 4-2 May 2018



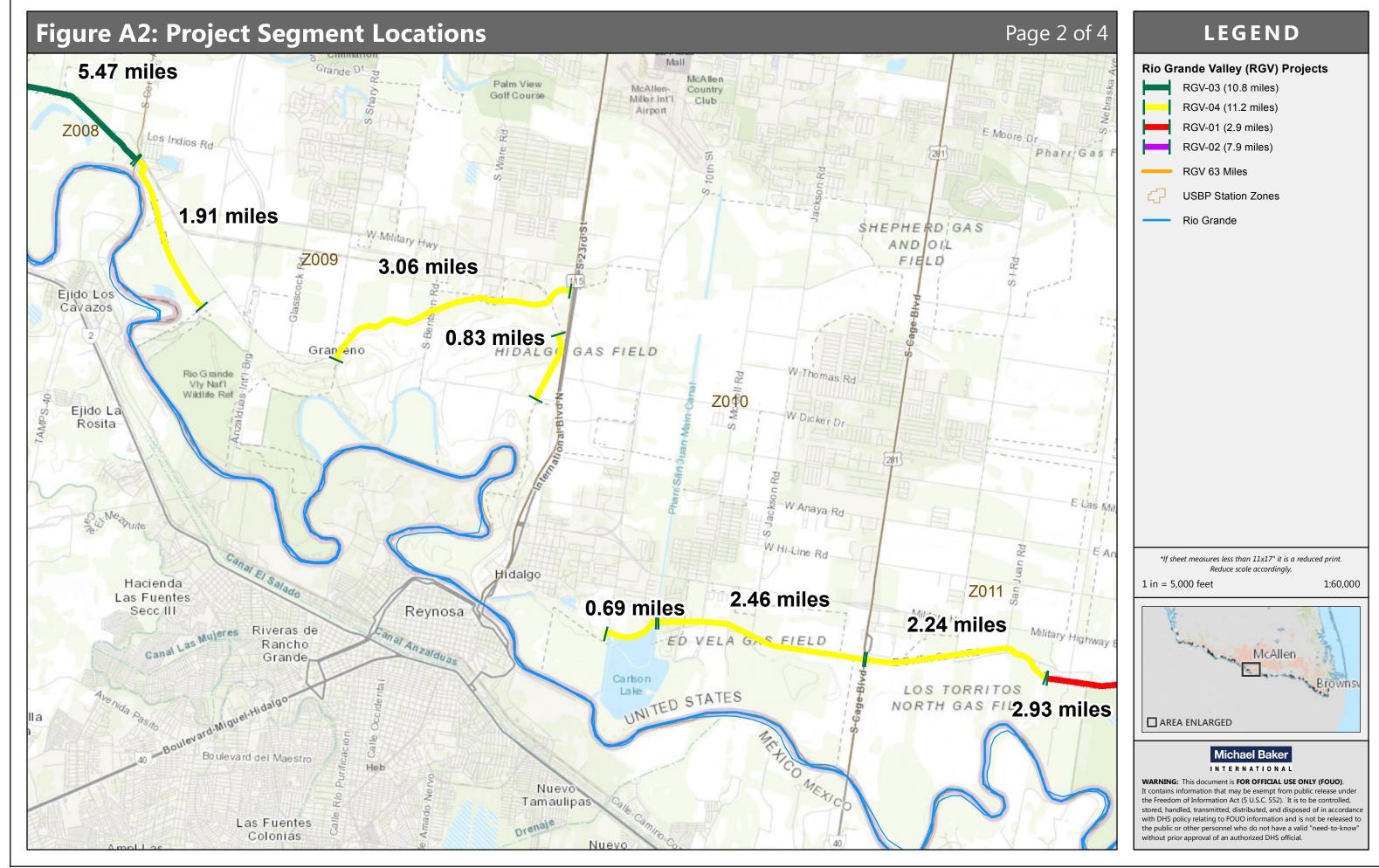
ATTACHMENT A

FIGURES

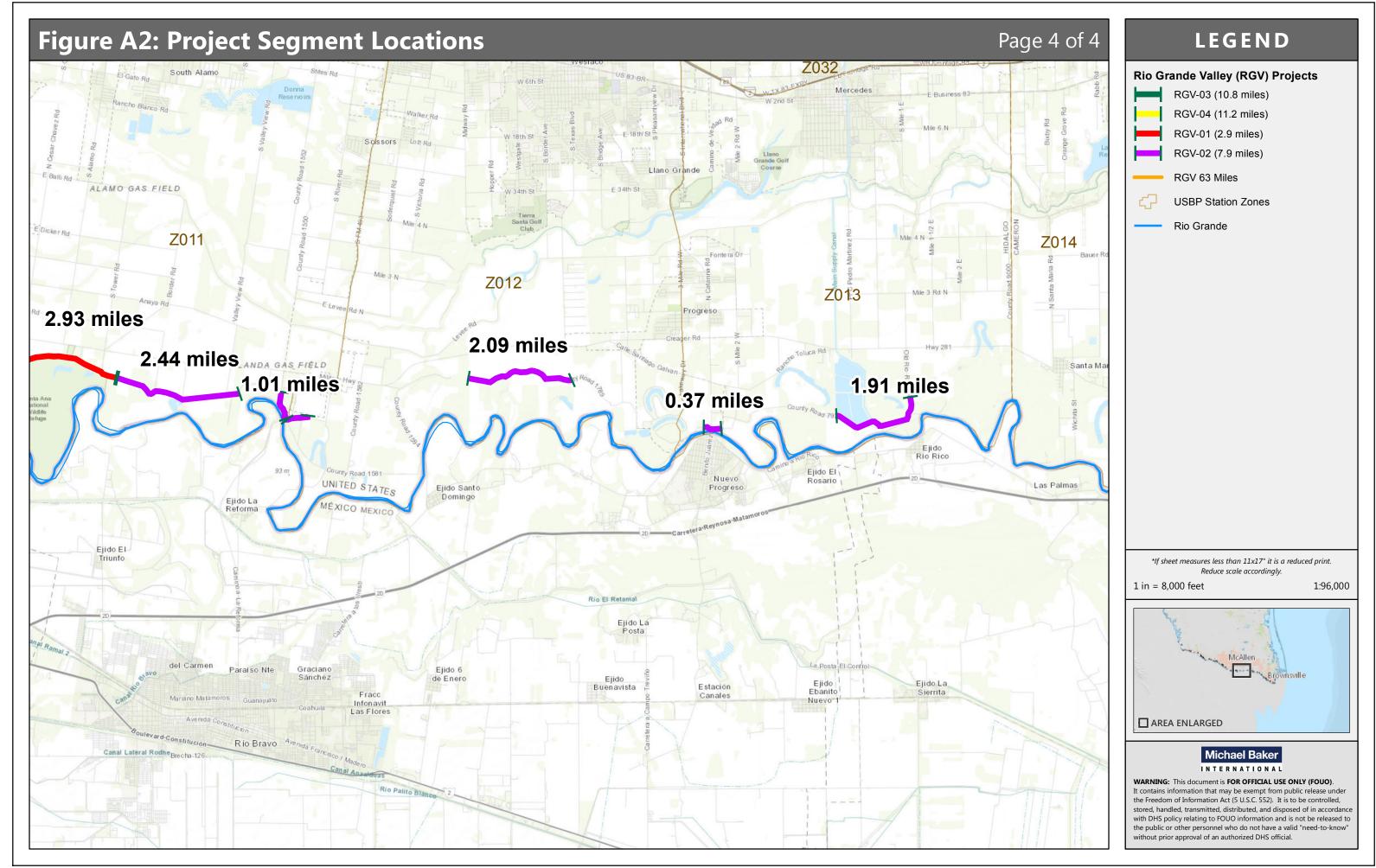
- > Figure A1: Vicinity Map
- > Figure A2: Project Segment Locations
- > Figure A3: FEMA Maps
- > Figure A4: Penitas to Hidalgo-Cameron County 1-D Model Cross-Section Map
- > Figure A5: Falcon Dam to Penitas Land Use Designations
- > Figure A6: Falcon Dam to Penitas 2-D Mesh and 1-D Cross-sections
- Figure A7: Falcon Dam to Penitas 2-D Model Floodplain
- > Figure A8: Falcon Dam to Penitas 2-D Proposed Wall Configuration
- > Figure A9: Falcon Dam to Penitas 2-D Deflection Calculation Cross-sections
- > Figure A10: Falcon Dam to Penitas 2-D WSE Comparison (Proposed Existing)











This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

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NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

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Figure A3-1 740000 FT 745000 FT 750000 FT 755000 FT 760000 FT 765000 FT 770000 FT 775000 FT 99° 15' 00" 99° 07' 30" 26° 37' 30" 16750000 FT-16745000 FT---FLOOD HAZARD INFORMATION IS NOT SHOWN ON THIS MAP IN AREAS OUTSIDE OF STARR COUNTY 16740000 FT 16735000 FT INTERNATIONAL FALCON RESERVOIR ZONE A 16730000 FT---Unincorporated Areas 480575 16725000 FT-16720000 FT-16715000 FT-16710000 FT-26° 29' 60"

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface

LEGEND

No Base Flood Elevations determined.

ZONE AF Base Flood Elevations determined.

elevation of the 1% annual chance flood.

ZONE AO

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone

AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

protection system under construction; no Base Flood Elevations determined. ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

flood heights.

OTHER FLOOD AREAS Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square

mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

> Areas in which flood hazards are undetermined, but possible. COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

> Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet* ~~~ 513~~~ Base Flood Elevation value where uniform within zone; elevation in

1000-meter Universal Transverse Mercator grid values, zone 14N

*Referenced to the North American Vertical Datum of 1988

(EL 987)

M1.5

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection

> Bench mark (see explanation in Notes to Users section of this FIRM MAP REPOSITORIES

Refer to Map Repositories list on Map Index EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 19, 2010 EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PANEL 0350C

FIRM FLOOD INSURANCE RATE MAP STARR COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 350 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY STARR COUNTY UNINCORPORATED AREAS 480575

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject



MAP NUMBER 48427C0350C **EFFECTIVE DATE**

Federal Emergency Management Agency

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Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

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The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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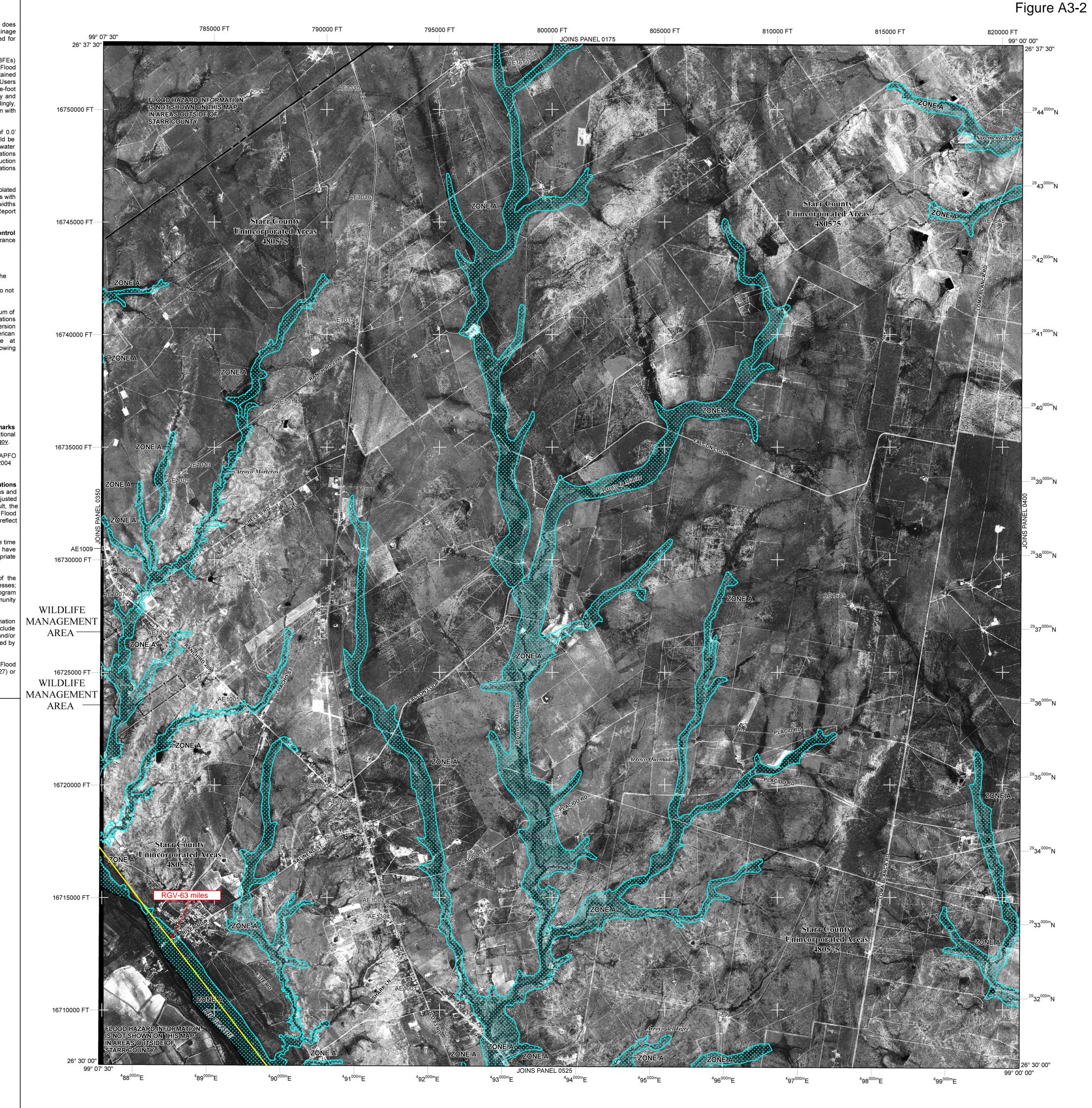
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LEGEND

No Base Flood Elevations determined.

Base Flood Elevations determined.

elevation of the 1% annual chance flood.

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone

AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs) CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary 0.2% Annual Chance Floodplain Boundary

Floodway boundary Zone D boundary

••••• CBRS and OPA boundary Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\* (EL 987)

Base Flood Elevation value where uniform within zone; elevation in \*Referenced to the North American Vertical Datum of 1988

(FIPS Zone 4205), Lambert Conformal Conic projection

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT

1000-meter Universal Transverse Mercator grid values, zone 14N Bench mark (see explanation in Notes to Users section of this FIRM M1.5

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PANEL 0375C

**FIRM** 

FLOOD INSURANCE RATE MAP STARR COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 375 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY STARR COUNTY UNINCORPORATED AREAS 480575 0375

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MAP NUMBER 48427C0375C **EFFECTIVE DATE** 

Federal Emergency Management Agency

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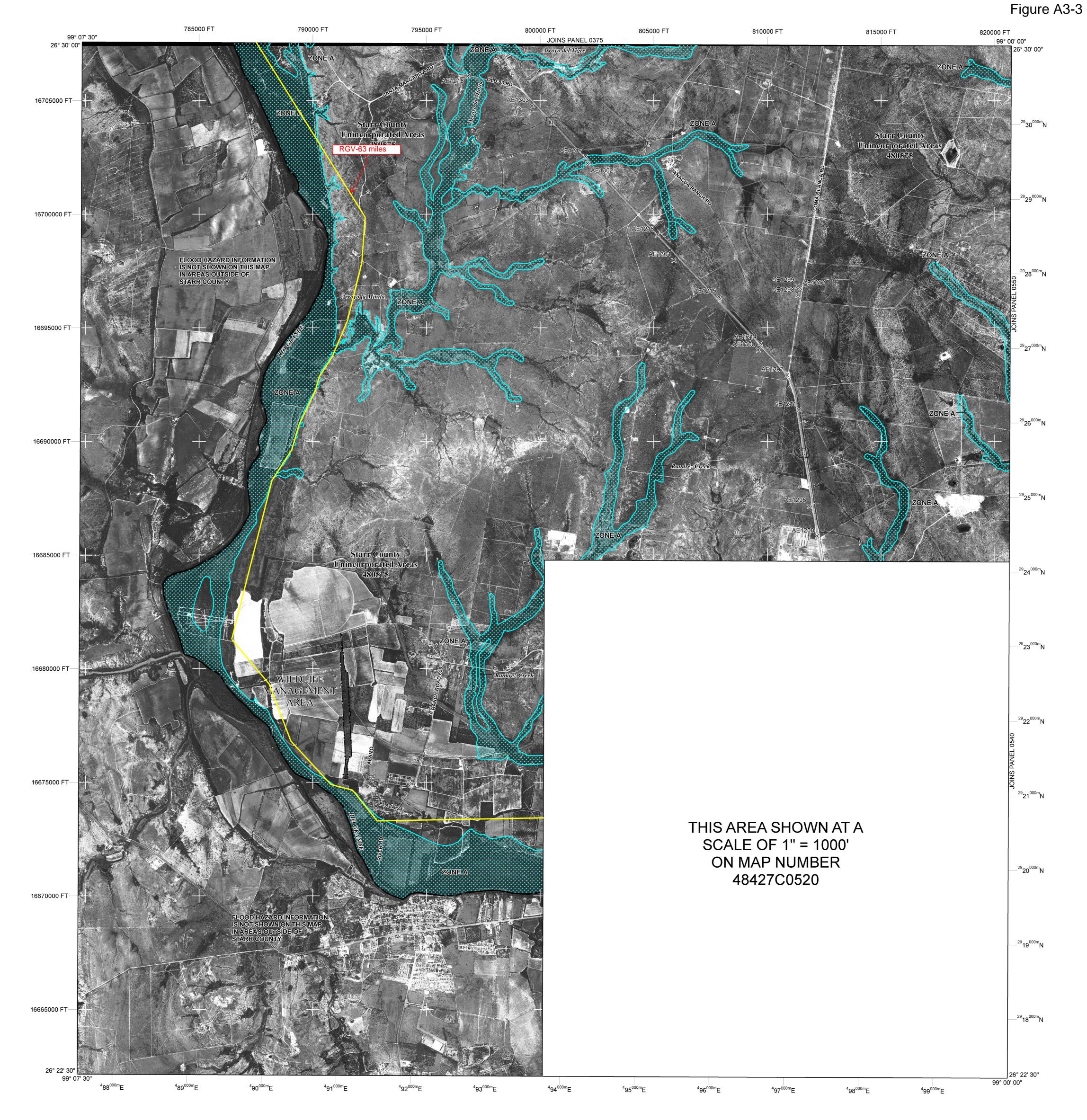
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#### **LEGEND**

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance

flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood

protection system under construction; no Base Flood Elevations determined. Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

ZONE X Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible. ZONE D

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities. ~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\*

Base Flood Elevation value where uniform within zone; elevation in (EL 987)

M1.5

\*Referenced to the North American Vertical Datum of 1988

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12"

1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection 1000-meter Universal Transverse Mercator grid values, zone 14N

> MAP REPOSITORIES Refer to Map Repositories list on Map Index EFFECTIVE DATE OF COUNTYWIDE

FLOOD INSURANCE RATE MAP April 19, 2010 EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Bench mark (see explanation in Notes to Users section of this FIRM

For community map revision history prior to countywide mapping, refer to the Community

Map History table located in the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

# PANEL 0525C

## **FIRM** FLOOD INSURANCE RATE MAP STARR COUNTY, TEXAS

AND INCORPORATED AREAS

**PANEL 525 OF 800** 

(SEE MAP INDEX FOR FIRM PANEL LAYOUT) CONTAINS:

COMMUNITY STARR COUNTY UNINCORPORATED AREAS 480575

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER 48427C0525C **EFFECTIVE DATE** Federal Emergency Management Agency

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control **structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following

NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713- 3242, or visit its website at <a href="http://www.ngs.noaa.gov">http://www.ngs.noaa.gov</a>.

Base map information shown on this FIRM was derived from USDA-FSA-APFO Aerial Photography Field Office at a scale of 1:12,000 from photography dated 2004

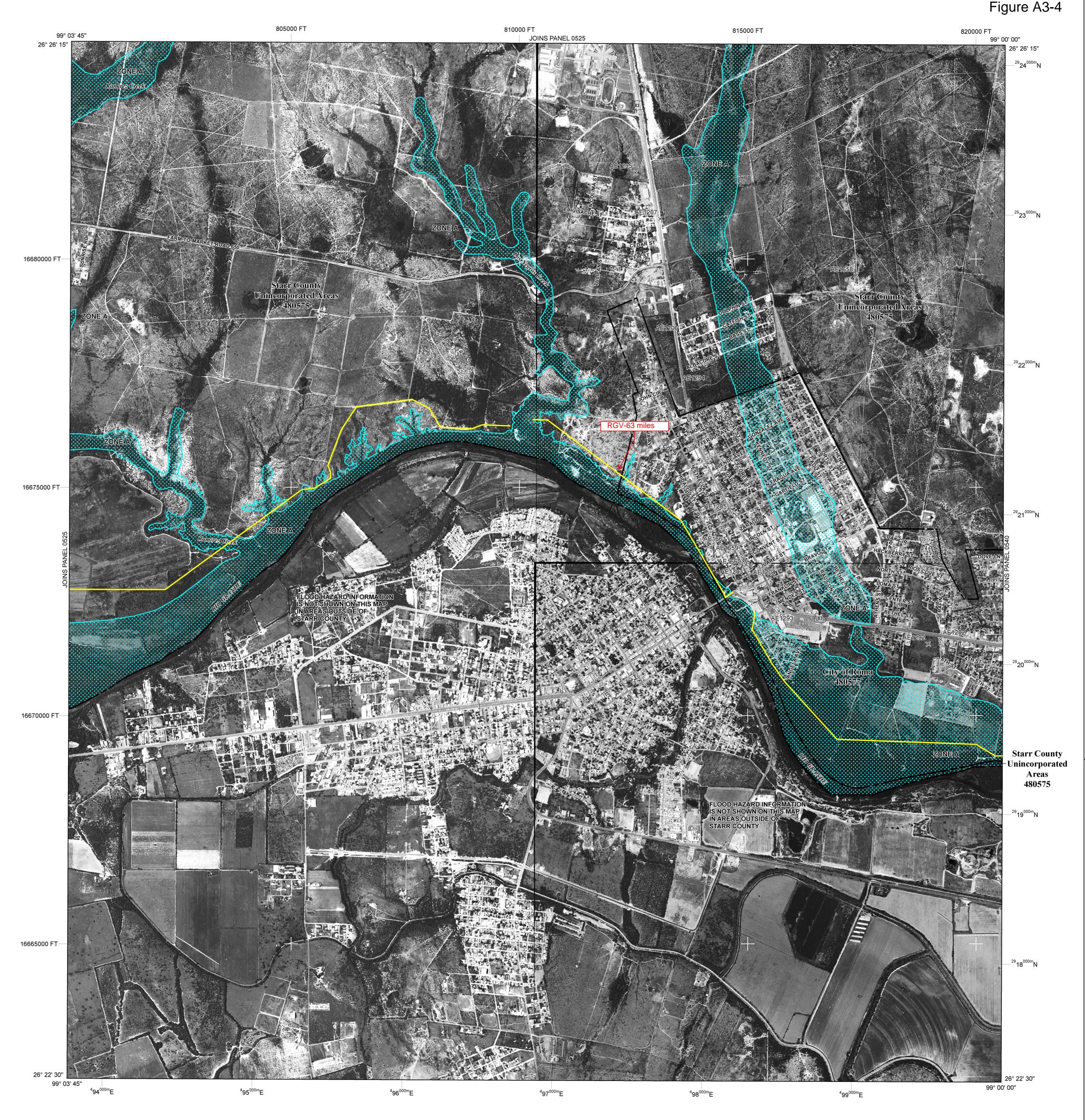
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



ZONE V

**LEGEND** SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard

include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface

elevation of the 1% annual chance flood. No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined. Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

**ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

> Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood

protection system under construction; no Base Flood Elevations determined. Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary 0.2% Annual Chance Floodplain Boundary

> Floodway boundary Zone D boundary

••••• CBRS and OPA boundary Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\* Base Flood Elevation value where uniform within zone; elevation in (EL 987)

*Referenced to the North American Vertical Datum of 1988

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection

1000-meter Universal Transverse Mercator grid values, zone 14N Bench mark (see explanation in Notes to Users section of this FIRM M1.5 MAP REPOSITORIES

> Refer to Map Repositories list on Map Index EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PANEL 0520C

FLOOD INSURANCE RATE MAP

STARR COUNTY,

TEXAS AND INCORPORATED AREAS

PANEL 520 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

ROMA, CITY OF STARR COUNTY, UNINCORPORATED AREAS 480575

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject



MAP NUMBER 48427C0520C **EFFECTIVE DATE** | Federal Emergency Management Agency

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following

NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713- 3242, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from USDA-FSA-APFO Aerial Photography Field Office at a scale of 1:12,000 from photography dated 2004

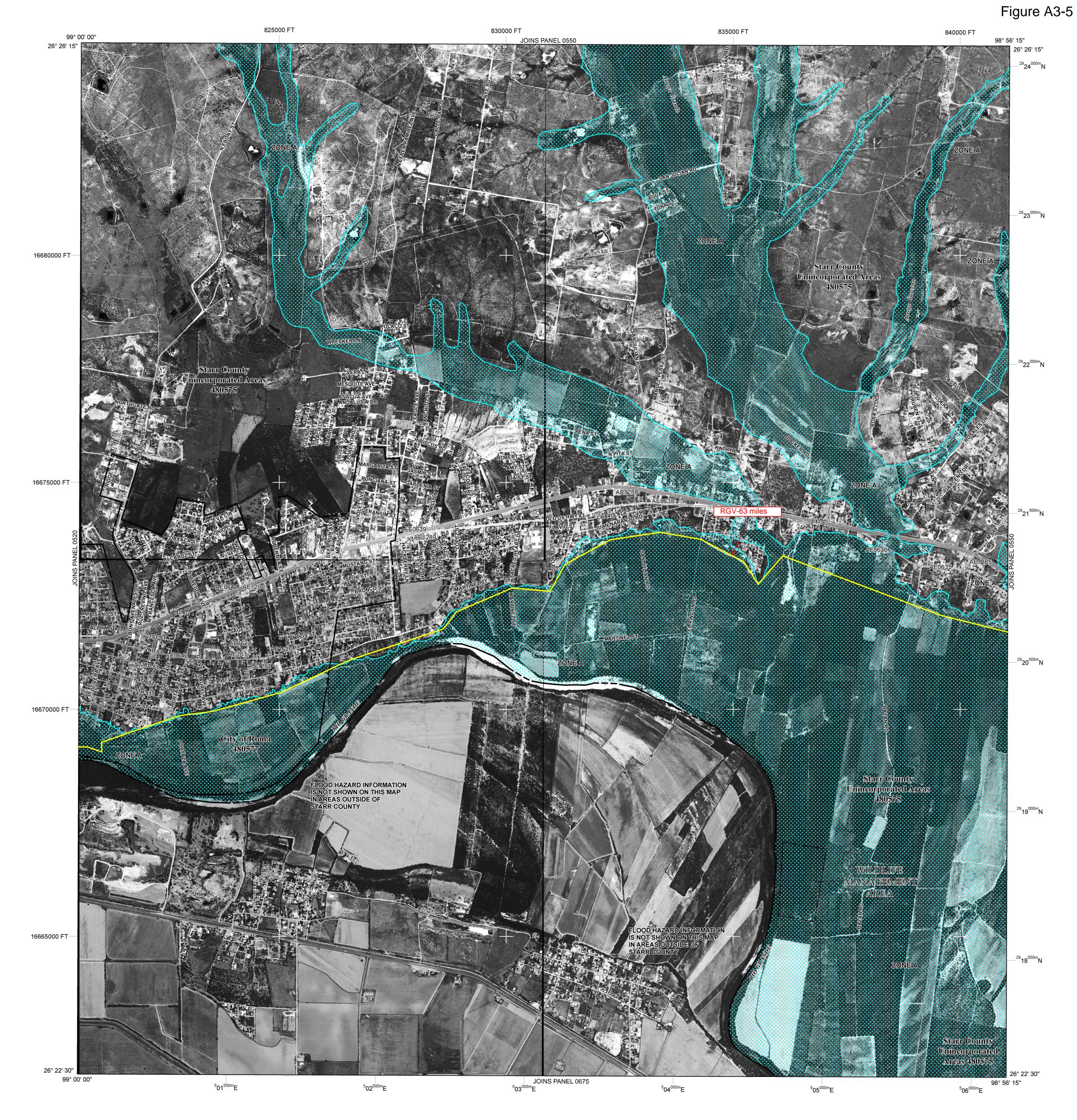
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1- 877- FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AO

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide

protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined. ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

> Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\* Base Flood Elevation value where uniform within zone; elevation in (EL 987)

\*Referenced to the North American Vertical Datum of 1988

M1.5

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection 1000-meter Universal Transverse Mercator grid values, zone 14N

> Bench mark (see explanation in Notes to Users section of this FIRM MAP REPOSITORIES

Refer to Map Repositories list on Map Index EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PANEL 0540C

**FIRM** FLOOD INSURANCE RATE MAP STARR COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 540 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

ROMA, CITY OF STARR COUNTY, UNINCORPORATED AREAS 480575

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER 48427C0540C **EFFECTIVE DATE** 

Federal Emergency Management Agency

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <a href="http://www.ngs.noaa.gov">http://www.ngs.noaa.gov</a> or contact the National Geodetic Survey at the following address:

NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at <a href="http://www.ngs.noaa.gov">http://www.ngs.noaa.gov</a>.

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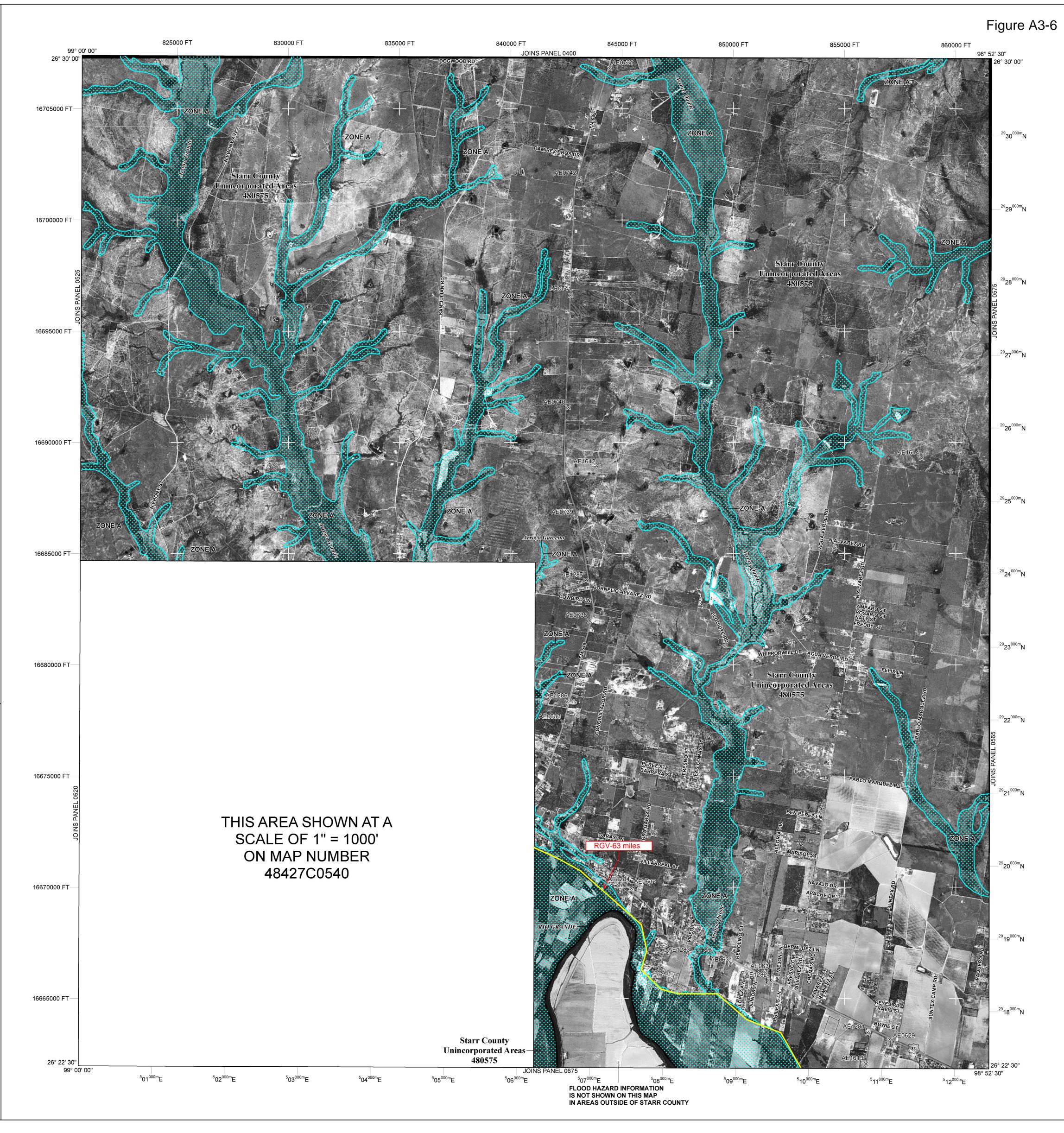
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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#### LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

Special Flood Hazard Areas formerly protected from the 1% annual chance

flood by a flood control system that was subsequently decertified. Zone
AR indicates that the former flood control system is being restored to provide
protection from the 1% annual chance or greater flood.

Area to be protected from 1% annual chance flood by a Federal flood

protection system under construction; no Base Flood Elevations determined.

Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

OTHER FLOOD AREAS

OTHER AREAS

flood heights.

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

 0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet\*

(EL 987)

Base Flood Elevation value where uniform within zone; elevation in feet\*

\*Referenced to the North American Vertical Datum of 1988

Cross section
Transect line

M1.5

45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

Bench mark (see explanation in Notes to Users section of this FIRM

3100000 FT 5000-foot ticks: Texas State Plane South Zone (FIPS Zone 4205), Lambert Conformal Conic projection

4989<sup>000m</sup> N 1000-meter Universal Transverse Mercator grid values, zone 14N

River Mile

MAP REPOSITORIES

Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

# PANEL 0550C

## **FIRM**

FLOOD INSURANCE RATE MAP
STARR COUNTY,
TEXAS
AND INCORPORATED AREAS

PANEL 550 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

E MAP INDEX FOR FIRM <u>ITAINS:</u>

COMMUNITY NUMBER PANEL SU STARR COUNTY, UNINCORPORATED AREAS 480575 0550

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER 48427C0550C EFFECTIVE DATE APRIL 19, 2010

Federal Emergency Management Agency

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NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

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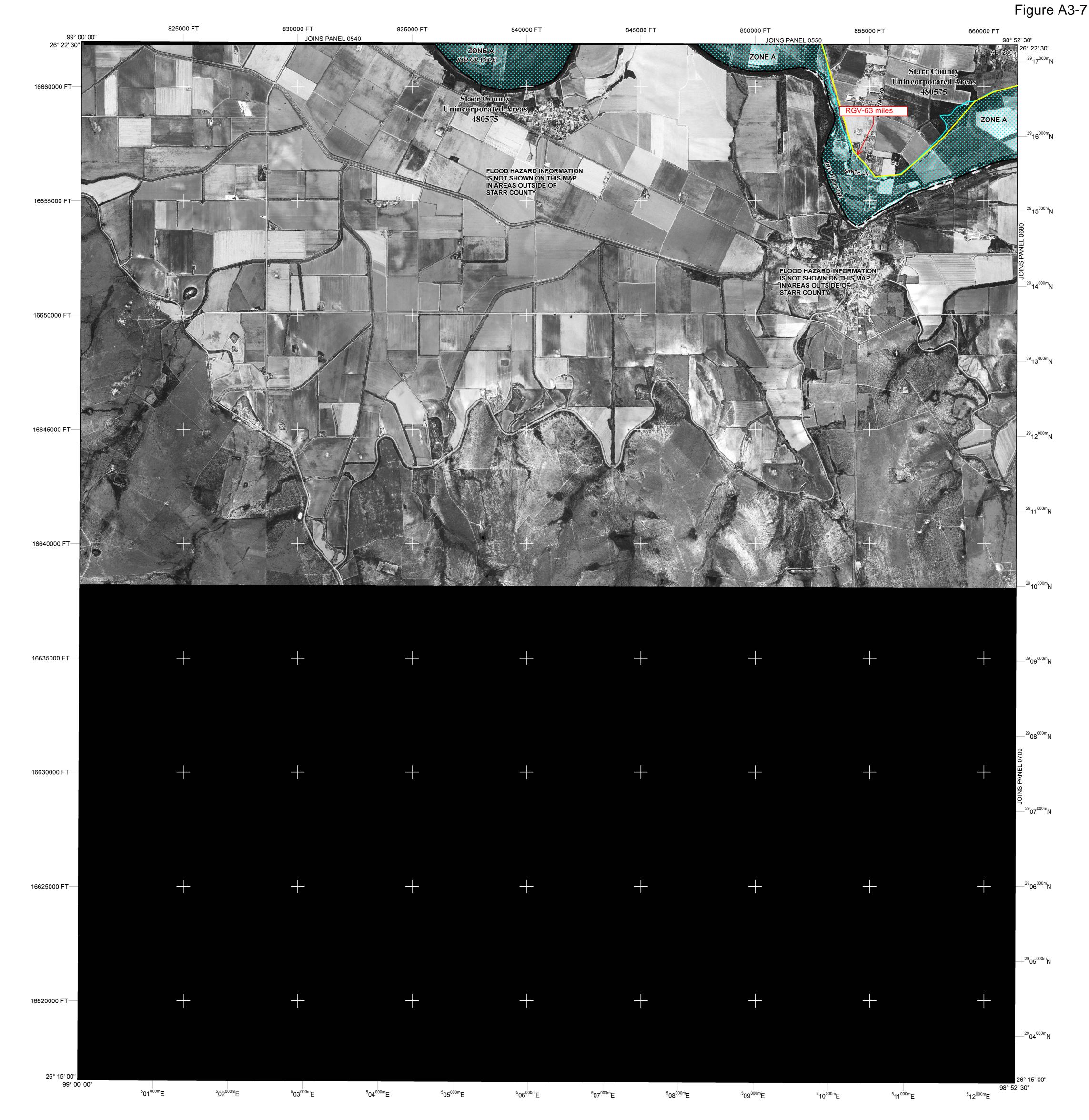
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#### **LEGEND**

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

**ZONE AO** 

ZONE V

**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

> Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance

flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood

protection system under construction; no Base Flood Elevations determined. Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

flood heights. OTHER FLOOD AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square

mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS ZONE X Areas determined to be outside the 0.2% annual chance floodplain. ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs) CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

> 1% Annual Chance Floodplain Boundary 0.2% Annual Chance Floodplain Boundary

Floodway boundary Zone D boundary

••••• CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities. ~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\*

Base Flood Elevation value where uniform within zone; elevation in \*Referenced to the North American Vertical Datum of 1988

23 - - - - - - - - - 23

(EL 987)

M1.5

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere

5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection 1000-meter Universal Transverse Mercator grid values, zone 14N Bench mark (see explanation in Notes to Users section of this FIRM

> MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 2000' FEET

# PANEL 0675C

FLOOD INSURANCE RATE MAP STARR COUNTY, **TEXAS** 

AND INCORPORATED AREAS

**PANEL 675 OF 800** 

(SEE MAP INDEX FOR FIRM PANEL LAYOUT) CONTAINS:

COMMUNITY <u>NUMBER</u> PANEL SUFFIX STARR COUNTY UNINCORPORATED AREAS 480575 0675 C

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject



MAP NUMBER 48427C0675C

**EFFECTIVE DATE** Federal Emergency Management Agency

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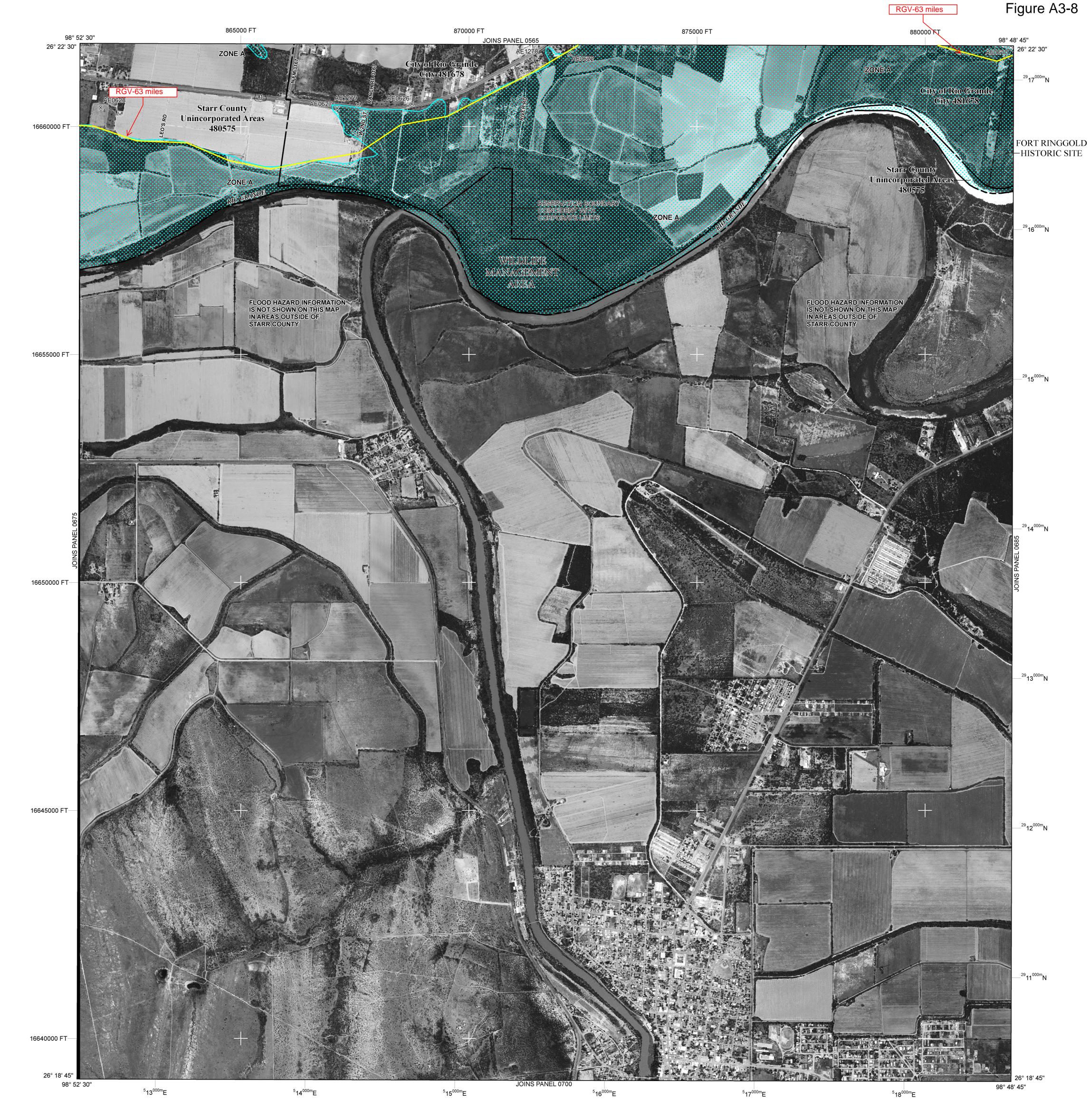
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#### **LEGEND**

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface

No Base Flood Elevations determined.

**ZONE AE** Base Flood Elevations determined.

elevation of the 1% annual chance flood.

**ZONE AO** 

ZONE X

ZONE D

**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AR

Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide

protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

determined.

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

depths determined. For areas of alluvial fan flooding, velocities also determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Areas determined to be outside the 0.2% annual chance floodplain.

Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary
 Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet\*

(EL 987)

Base Flood Elevation value where uniform within zone; elevation in

\*Referenced to the North American Vertical Datum of 1988

(A) Cross section (23) - - - - - (23) Transect

3100000 FT

M1.5

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

5000-foot ticks: Texas State Plane South Zone

(FIPS Zone 4205), Lambert Conformal Conic projection

1000-meter Universal Transverse Mercator grid values, zone 14N

Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 1000'

500 0 1000 2000

FEET

METERS

## PANEL 0680C

## FIRM

STARR COUNTY,
TEXAS

AND INCORPORATED AREAS

PANEL 680 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY NUMBER PANEL SU
RIO GRANDE CITY,
CITY OF 481678 0680

STARR COUNTY,
UNINCORPORATED AREAS 480575 0680

Notice to User: The **Map Number** shown below

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MAP NUMBER 48427C0680C EFFECTIVE DATE APRIL 19, 2010

APRIL 19, 2010
Federal Emergency Management Agency

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No Base Flood Elevations determined.

Base Flood Elevations determined.

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

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AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

ZONE X Areas determined to be outside the 0.2% annual chance floodplain. ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

> 0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

> Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\* Base Flood Elevation value where uniform within zone; elevation in (EL 987)

*Referenced to the North American Vertical Datum of 1988

M1.5

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PANEL 0565C **FIRM** FLOOD INSURANCE RATE MAP

STARR COUNTY, **TEXAS** AND INCORPORATED AREAS

PANEL 565 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY RIO GRANDE CIT

UNINCORPORATED AREAS 480575 0565

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MAP NUMBER 48427C0565C **EFFECTIVE DATE**

Federal Emergency Management Agency

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-10

ZONE AO

ZONE V

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

Base Flood Elevations determined.

ZONE AE Base Flood Elevations determine

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone

AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

OTHER FLOOD AREAS

OTHER AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary0.2% Annual Chance Floodplain BoundaryFloodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet*

(EL 987)

Base Flood Elevation value where uniform within zone; ele

(EL 987)

Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A Cross se

M1.5

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

3100000 FT 5000-foot ticks: Texas State Plane South Zone (FIPS Zone 4205), Lambert Conformal Conic projection

4989^{000m} N 1000-meter Universal Transverse Mercator grid values, zone 14N

Bench mark (see explanation in Notes to Users section of this FIRM panel)
River Mile
MAP REPOSITORIES
Refer to Map Repositories list on Map Index

Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 19, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000' 0 1000 2000

PANEL 0685C

FIRM

FLOOD INSURANCE RATE MAP
STARR COUNTY,
TEXAS

AND INCORPORATED AREAS

PANEL 685 OF 800

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY NUMBER PANEL SUFFIX
RIO GRANDE CITY,
CITY OF 481678 0685 C

STARR COUNTY.

STARR COUNTY,
UNINCORPORATED AREAS 480575 0685

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

Federal Emergency Management Agency



MAP NUMBER 48427C0685C EFFECTIVE DATE APRIL 19, 2010

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following

NGS Information Services NOAA. N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713- 3242, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from USDA-FSA-APFO Aerial Photography Field Office at a scale of 1:12,000 from photography dated 2004

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

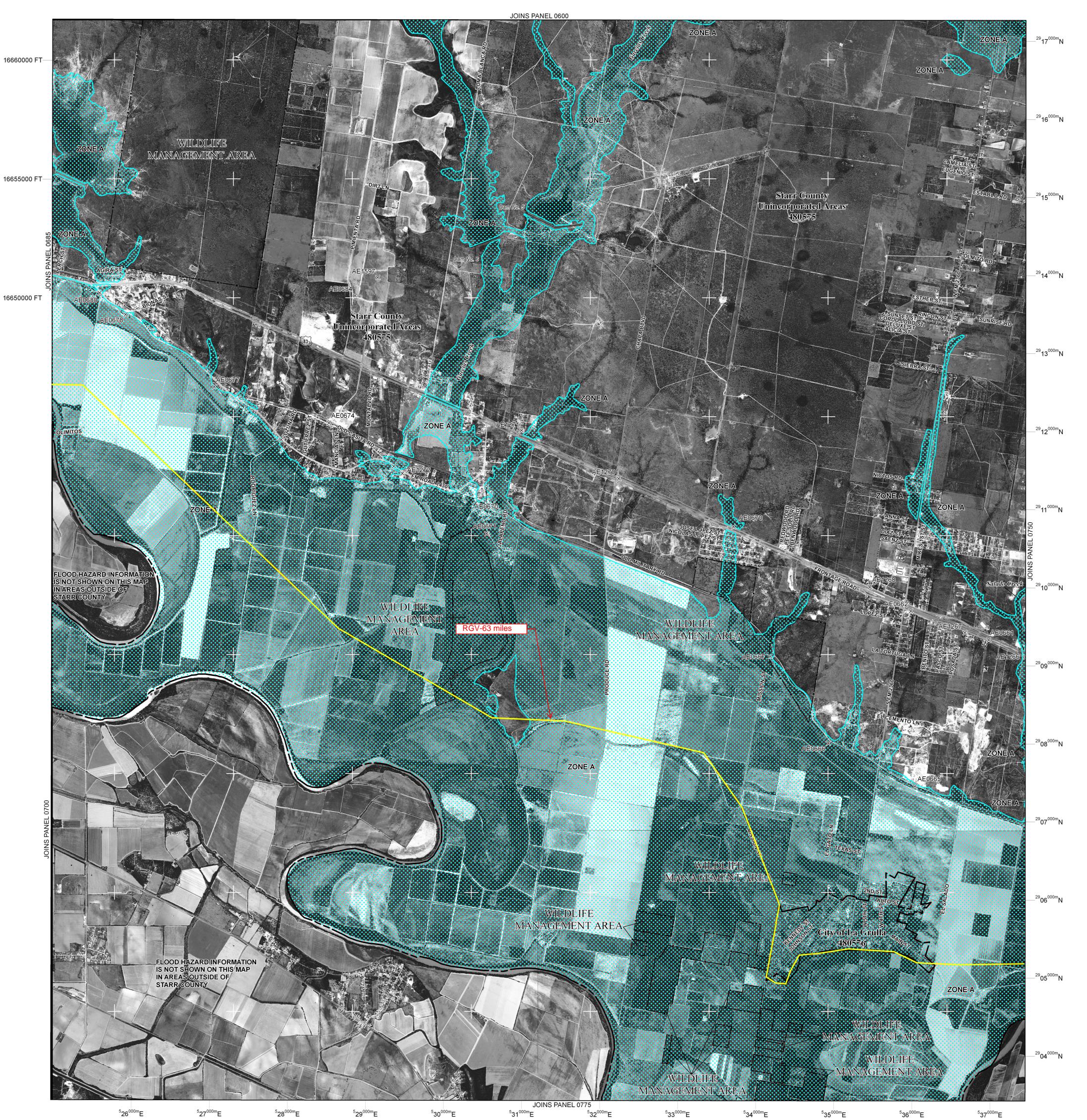
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

Figure A3-11



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AO

ZONE V

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone

AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood

protection system under construction; no Base Flood Elevations determined. Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average

depths determined. For areas of alluvial fan flooding, velocities also determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in

flood heights. OTHER FLOOD AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square

mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS ZONE X Areas determined to be outside the 0.2% annual chance floodplain. ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

> Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\*

Base Flood Elevation value where uniform within zone; elevation in (EL 987)

M1.5

\*Referenced to the North American Vertical Datum of 1988

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere

5000-foot ticks: Texas State Plane South Zone 3100000 FT (FIPS Zone 4205), Lambert Conformal Conic projection 1000-meter Universal Transverse Mercator grid values, zone 14N

> MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP April 19, 2010

Bench mark (see explanation in Notes to Users section of this FIRM

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.



# PANEL 0725C

## **FIRM** FLOOD INSURANCE RATE MAP STARR COUNTY, **TEXAS**

AND INCORPORATED AREAS

**PANEL 725 OF 800** 

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

480576 0725 LA GRULLA, CITY OF UNINCORPORATED AREAS 480575 0725

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject



MAP NUMBER 48427C0725C **EFFECTIVE DATE** | Federal Emergency Management Agency

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control **structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane South Zone (FIPS zone 4205). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following

NGS Information Services NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

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Base map information shown on this FIRM was derived from USDA-FSA-APFO Aerial Photography Field Office at a scale of 1:12,000 from photography dated 2004

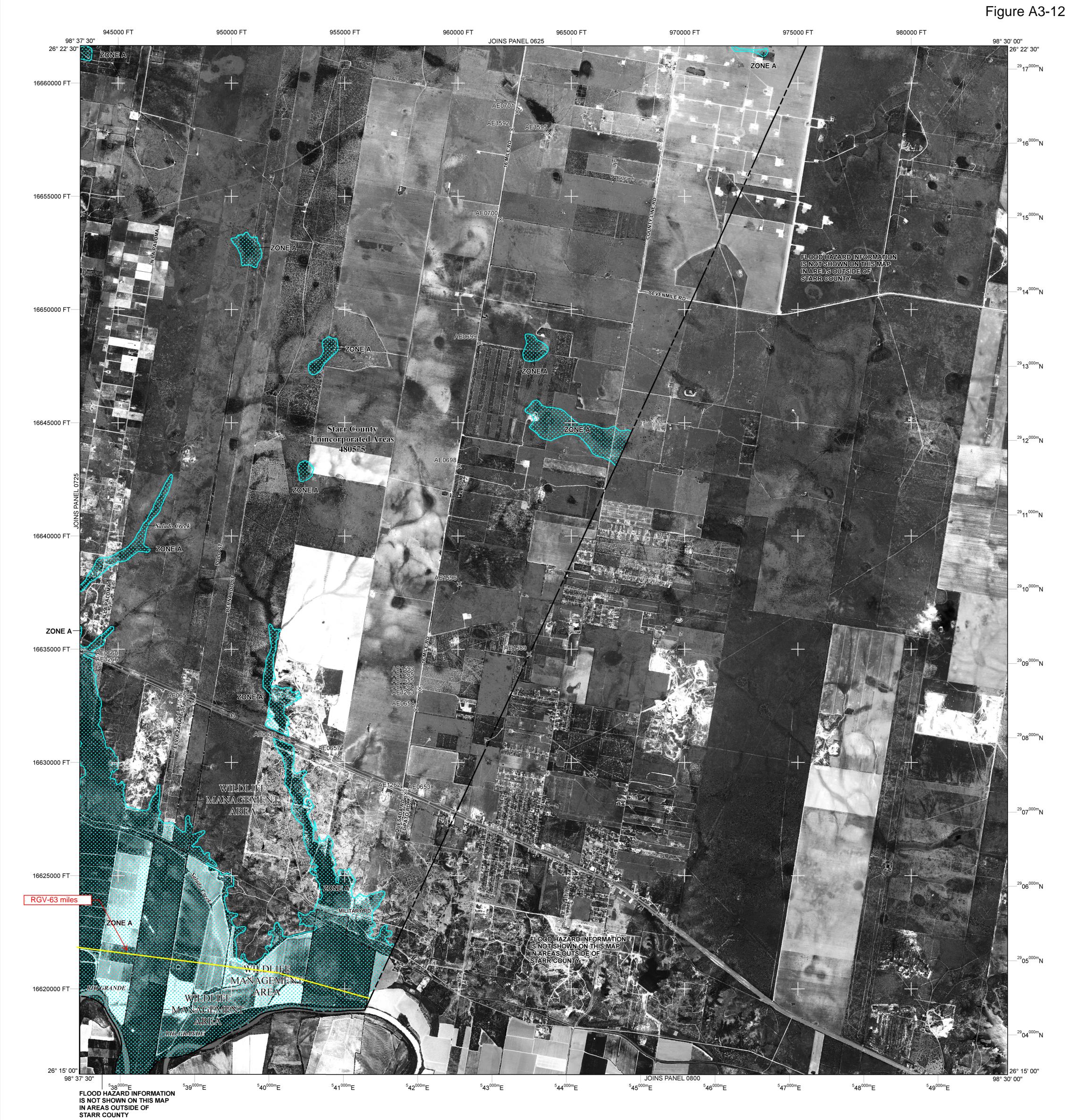
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1- 877- FEMA MAP (1-877-336-2627) or visit the FEMA website at <a href="http://www.fema.gov/business/nfip/">http://www.fema.gov/business/nfip/</a>.



#### **LEGEND**

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface

No Base Flood Elevations determined.

Base Flood Elevations determined.

elevation of the 1% annual chance flood.

ZONE AE

ZONE AH

**ZONE AO** 

ZONE V

ZONE X

ZONE D

(EL 987)

M1.5

Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations

Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. Special Flood Hazard Areas formerly protected from the 1% annual chance

flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined. Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations

Coastal flood zone with velocity hazard (wave action); Base Flood Elevations

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. 1% Annual Chance Floodplain Boundary

> 0.2% Annual Chance Floodplain Boundary Floodway boundary

Zone D boundary ••••• CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~~ 513~~~ Base Flood Elevation line and value; elevation in feet\*

Base Flood Elevation value where uniform within zone; elevation in *Referenced to the North American Vertical Datum of 1988

(FIPS Zone 4205), Lambert Conformal Conic projection

23) - - - - - - - - - - - - - - - 23)

Geographic coordinates referenced to the North American Datum of 45° 02' 08", 93° 02' 12" 1983 (NAD 83) Western Hemisphere 5000-foot ticks: Texas State Plane South Zone 3100000 FT

> 1000-meter Universal Transverse Mercator grid values, zone 14N Bench mark (see explanation in Notes to Users section of this FIRM MAP REPOSITORIES

Refer to Map Repositories list on Map Index EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 19, 2010 EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community

Map History table located in the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PANEL 0750C

FIRM FLOOD INSURANCE RATE MAP STARR COUNTY, TEXAS

AND INCORPORATED AREAS

PANEL 750 OF 800 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

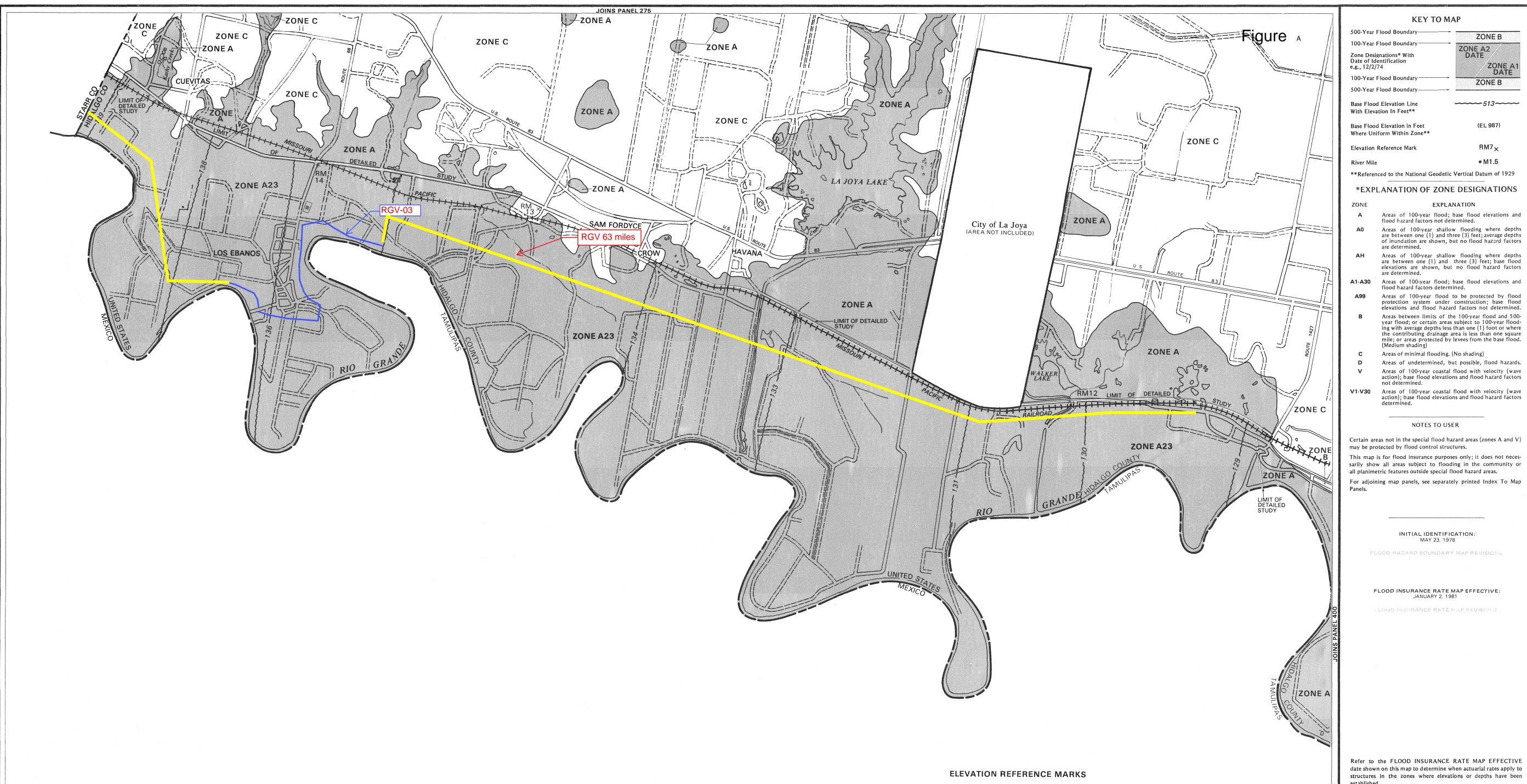
COMMUNITY STARR COUNTY UNINCORPORATED AREAS 480575 0750

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject



MAP NUMBER 48427C0750C **EFFECTIVE DATE**

Federal Emergency Management Agency



| REFERENCE
MARK | ELEVATION
(FT. NGVD) | DESCRIPTION OF LOCATION |
|-------------------|-------------------------|--|
| RM 12 | 125.47 | U.S.G.C. BM "125 1975 1913" 1.6 miles west of Penitas Station along the Missouri Pacific Railroad. |
| RM 13 | 155.01 | A cotton pin spindle in a power pole on the southwest corner of the intersection of gravel roads 0.1 mile north of Missouri Pacific Railroad Station at Sam Fordyce. |
| RM 14 | 133.14 | A cotton pin spindle in power pole on the southeast corner of the intersection of Farm Market 88 and Missouri Pacific Railroad, 1.5 miles north Sam Fordyce. |

KEY TO MAP

500-Year Flood Boundary-100-Year Flood Boundary

ZONE B ZONE A2 DATE ZONE A1 DATE ZONE B

513---

RM7×

Base Flood Elevation Line

With Elevation In Feet** (EL 987) Base Flood Elevation in Feet Where Uniform Within Zone**

● M1.5 River Mile **Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

EXPLANATION Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors

A1-A30 Areas of 100-year flood; base flood elevations and flood hazard factors determined.

Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.

Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)

Areas of minimal flooding. (No shading)

Areas of undetermined, but possible, flood hazards. Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors

Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures. This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or

all planimetric features outside special flood hazard areas. For adjoining map panels, see separately printed Index To Map

> INITIAL IDENTIFICATION: MAY 23, 1978

FLOOD INSURANCE RATE MAP EFFECTIVE: JANUARY 2, 1981

date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.



NATIONAL FLOOD INSURANCE PROGRAM

FRM

FLOOD INSURANCE RATE MAP

HIDALGO COUNTY, TEXAS (UNINCORPORATED AREAS)

PANEL 375 OF 525

COMMUNITY-PANEL NUMBER 480334 0375 B

> EFFECTIVE DATE: JANUARY 2, 1981

federal emergency management agency federal insurance administration



KEY TO MAP

500-Year Flood Boundary 100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

ZONE A2 DATE ZONE A ZONE B

Base Flood Elevation Line With Elevation In Feet**

---- 513----

(EL 987)

RM7×

ZONE B

Base Flood Elevation in Feet

Elevation Reference Mark

• M1.5 River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

EXPLANATION

Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.

Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors

Areas of 100-year flood; base flood elevations and flood hazard factors determined.

Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where

the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) Areas of minimal flooding. (No shading)

Areas of undetermined, but possible, flood hazards.

Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. Areas of 100-year coastal flood with velocity (wave

action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures. This map is for flood insurance purposes only; it does not neces-

sarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. For adjoining map panels, see separately printed Index To Map

INITIAL IDENTIFICATION: MAY 23, 1978

FLOOD INSURANCE RATE MAP EFFECTIVE: JANUARY 2, 1981

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.



APPROXIMATE SCALE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

HIDALGO COUNTY, **TEXAS**

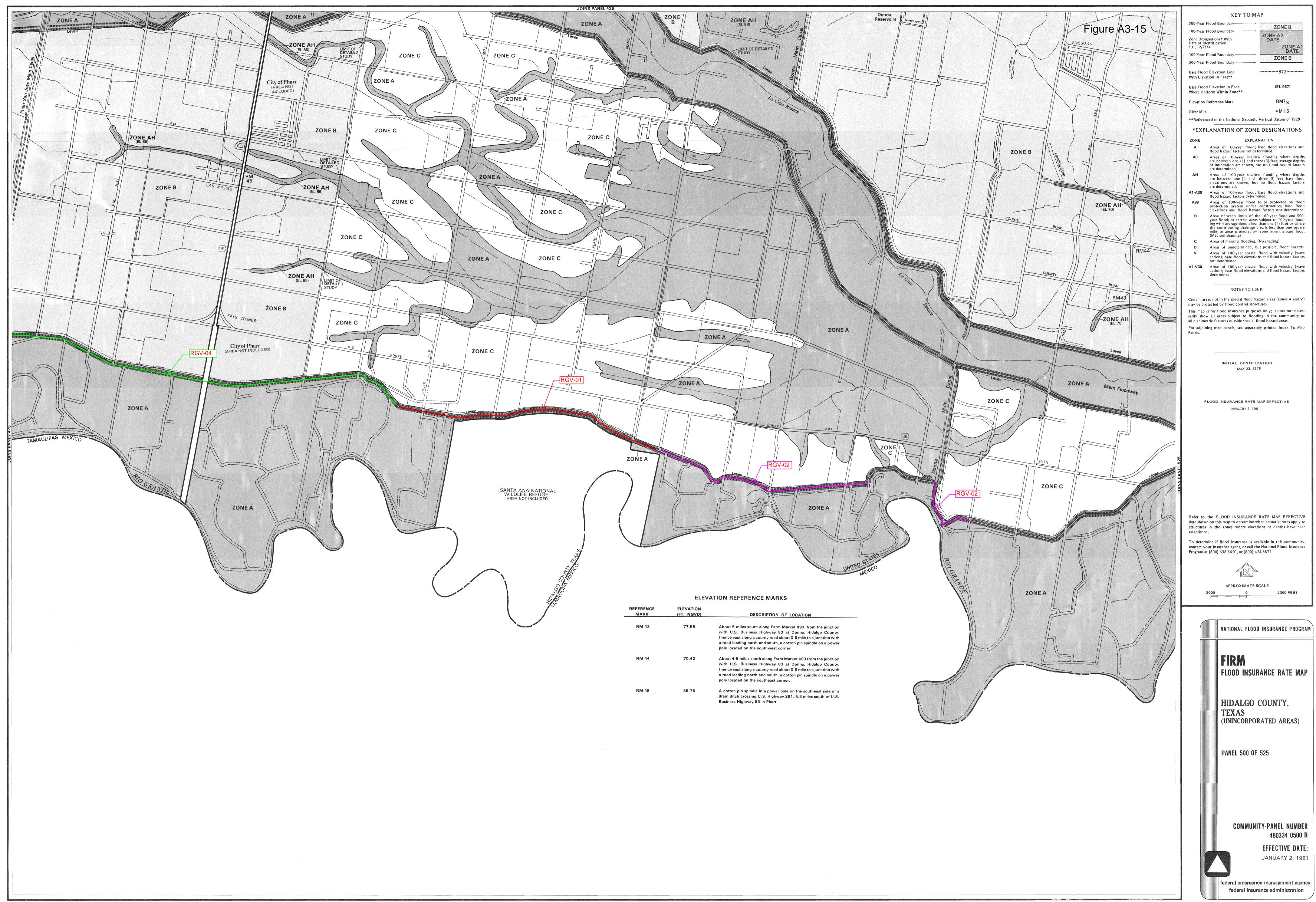
(UNINCORPORATED AREAS)

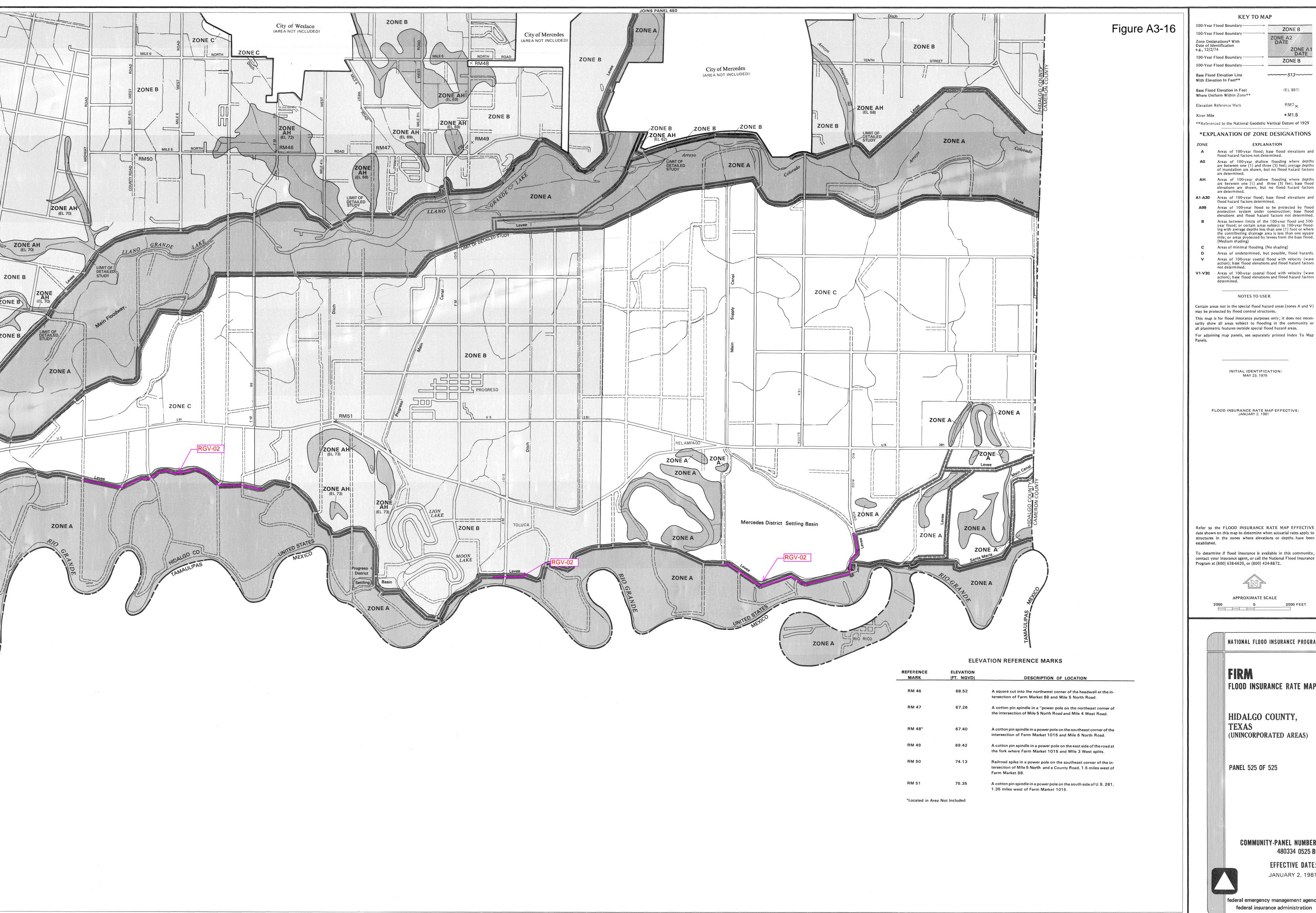
PANEL 475 OF 525

COMMUNITY-PANEL NUMBER 480334 0475 B

> EFFECTIVE DATE: **JANUARY 2, 1981**

federal emergency management agency federal insurance administration





KEY TO MAP

500-Year Flood Boundary-100-Year Flood Boundary Zone Designations* With Date of Identification e.g., 12/2/74 100-Year Flood Boundary ZONE B 500-Year Flood Boundary

Where Uniform Within Zone** Elevation Reference Mark

• M1.5 **Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION

Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

513----

(EL 987)

A0 Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.

AH Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.

A1-A30 Areas of 100-year flood; base flood elevations and flood hazard factors determined.

Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. Areas between limits of the 100-year flood and 500year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)

Areas of minimal flooding. (No shading)

Areas of undetermined, but possible, flood hazards. Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors

not determined. V1-V30 Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

may be protected by flood control structures. This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. For adjoining map panels, see separately printed Index To Map

INITIAL IDENTIFICATION:

FLOOD INSURANCE RATE MAP EFFECTIVE: JANUARY 2, 1981

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.



APPROXIMATE SCALE

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

HIDALGO COUNTY, (UNINCORPORATED AREAS)

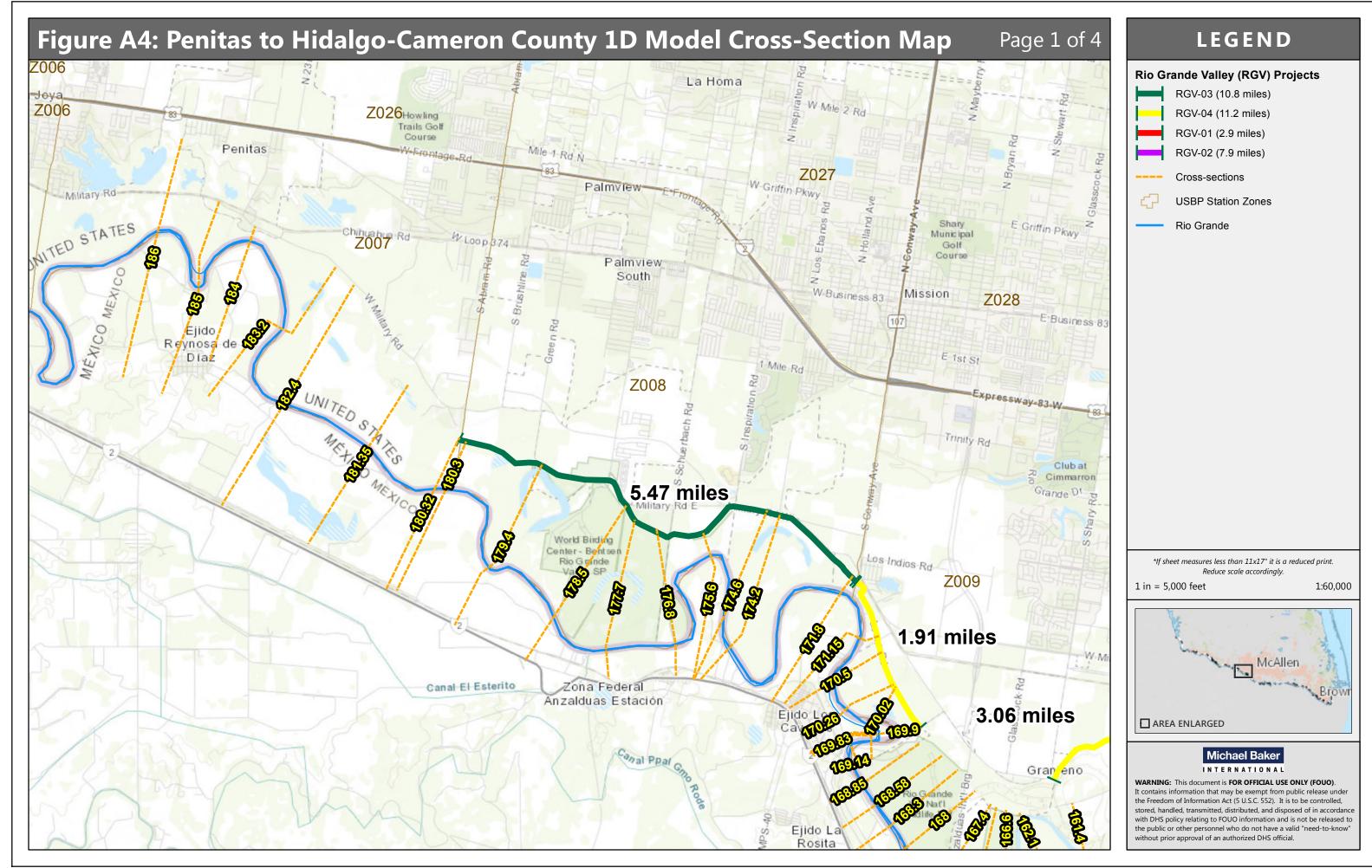
PANEL 525 OF 525

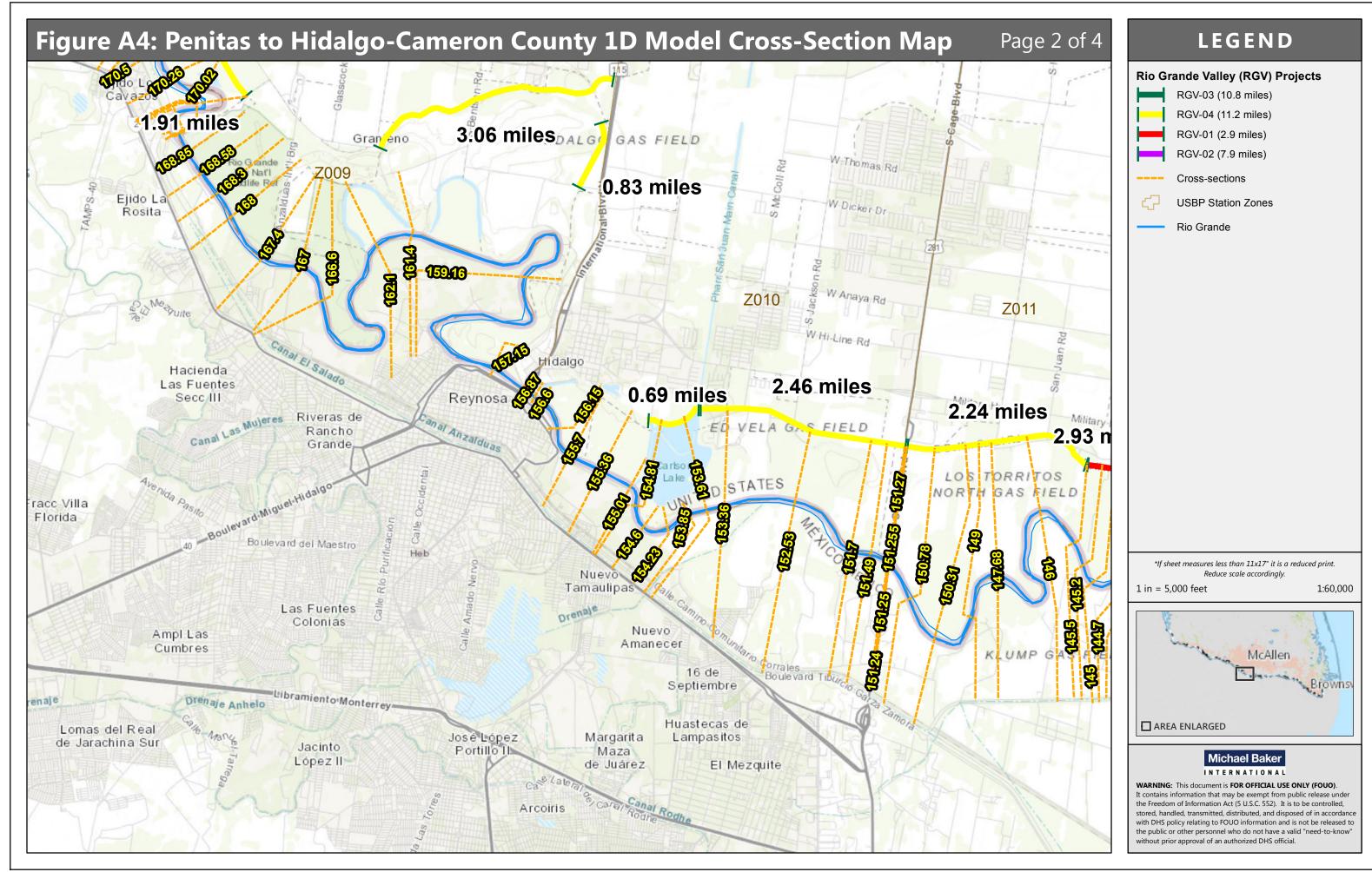
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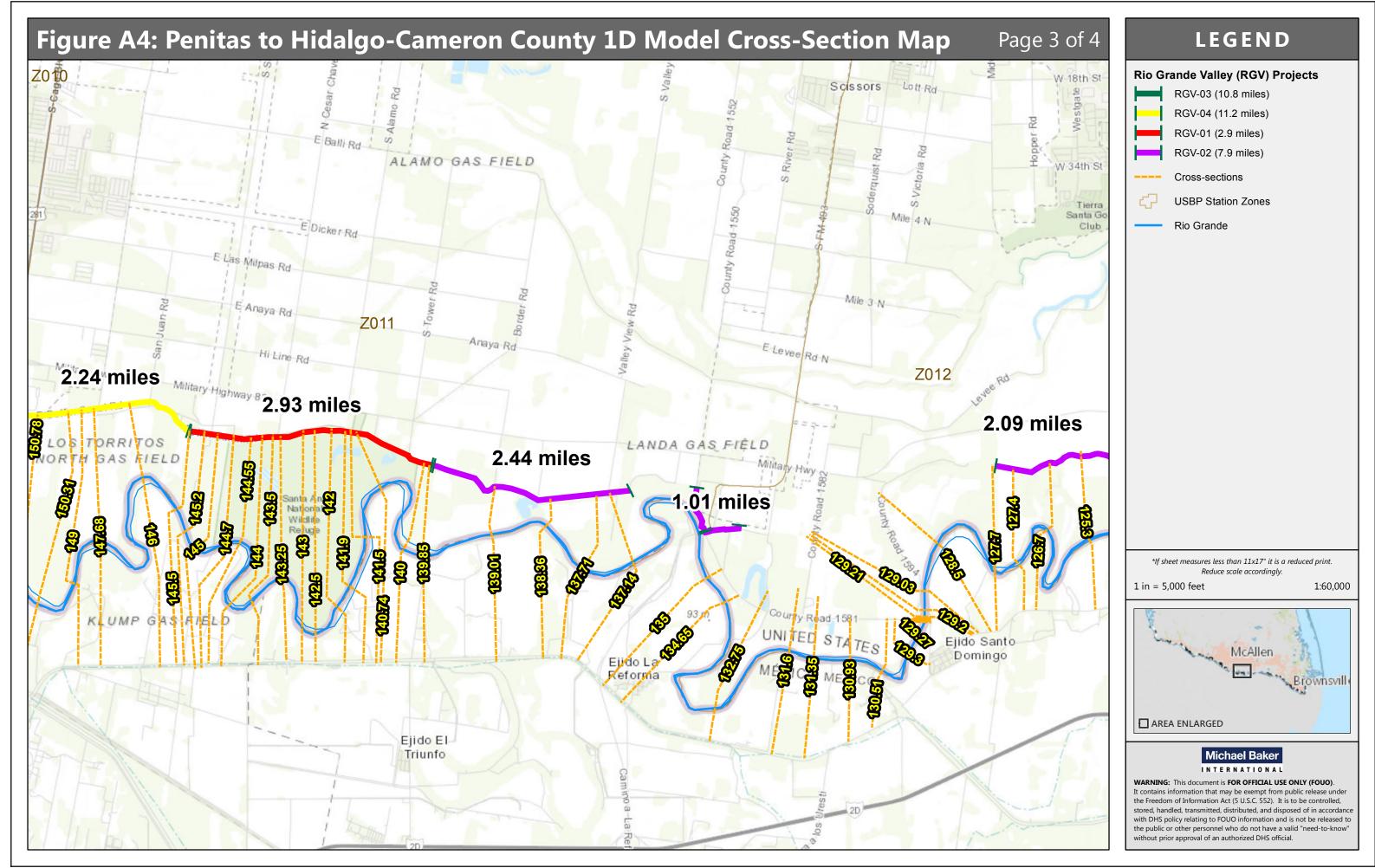


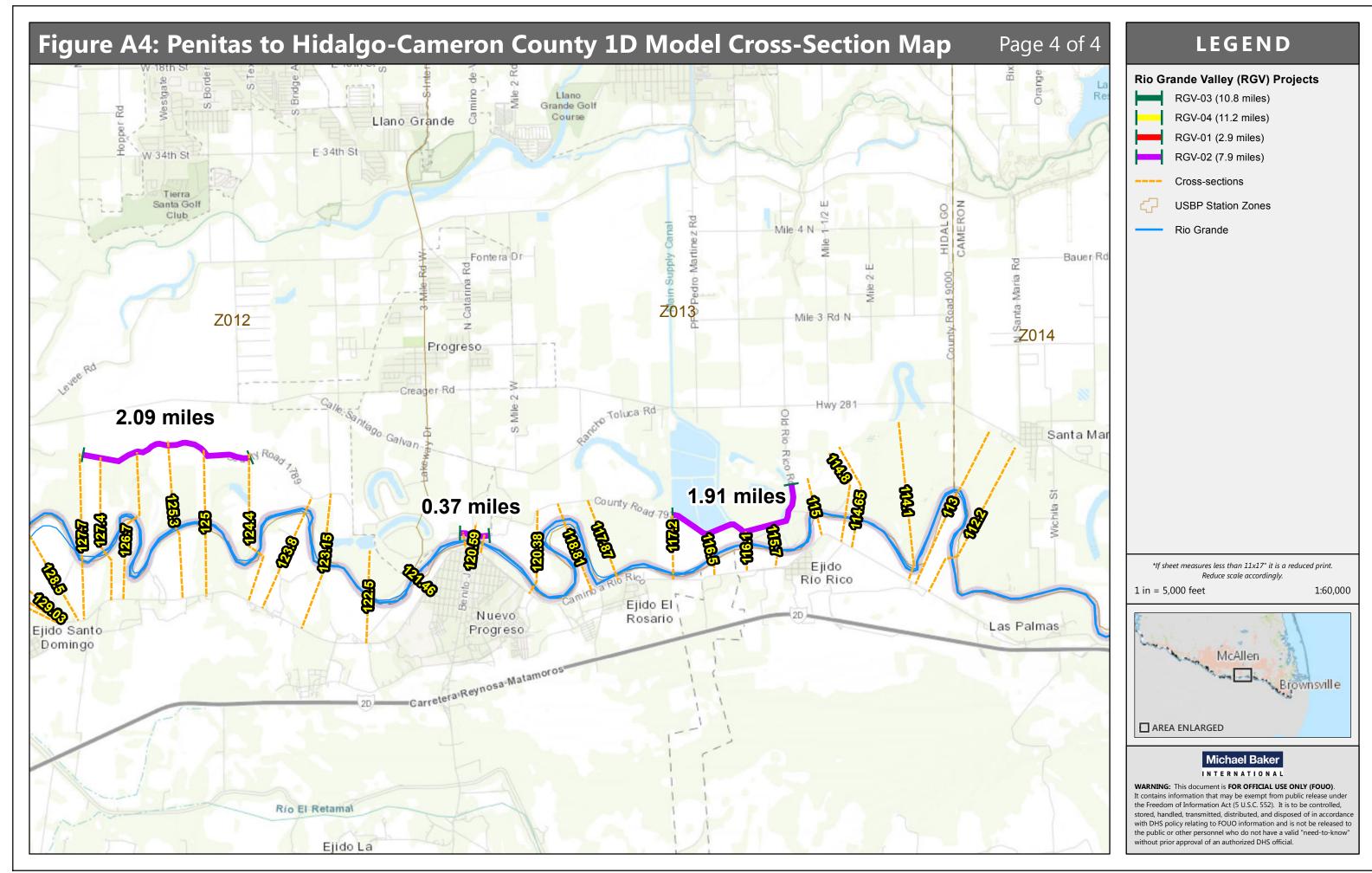
federal emergency management agency federal insurance administration

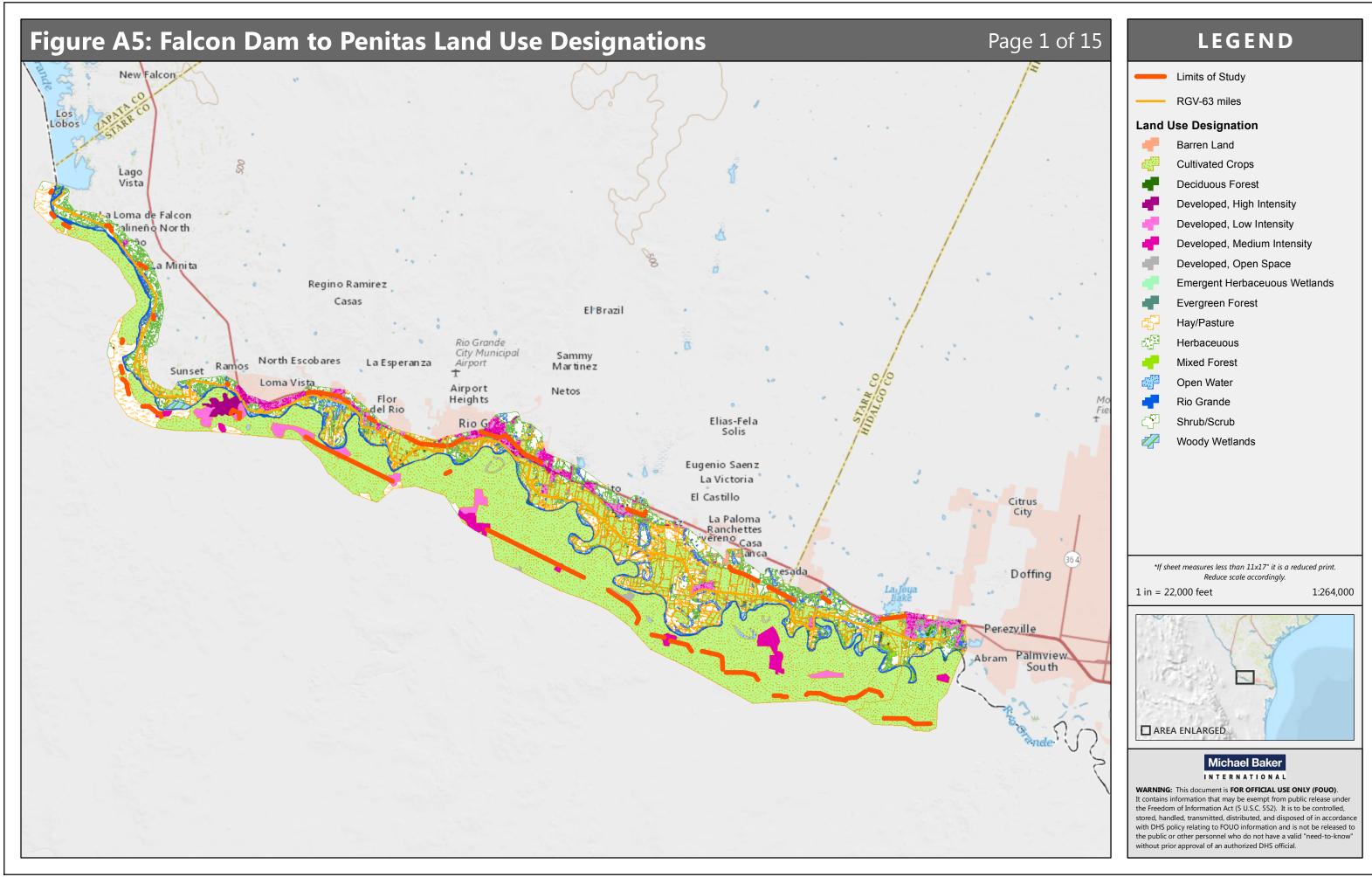
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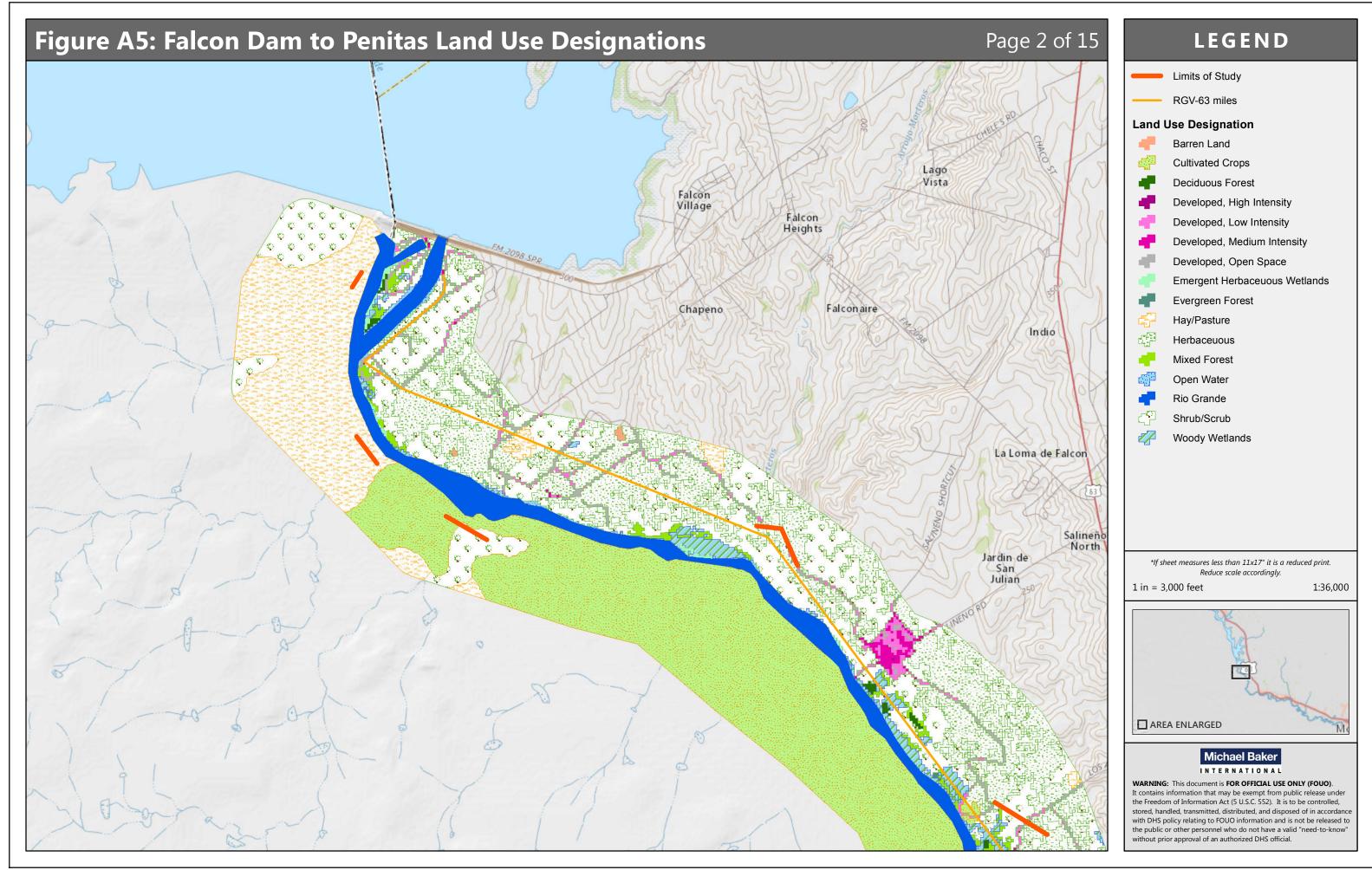


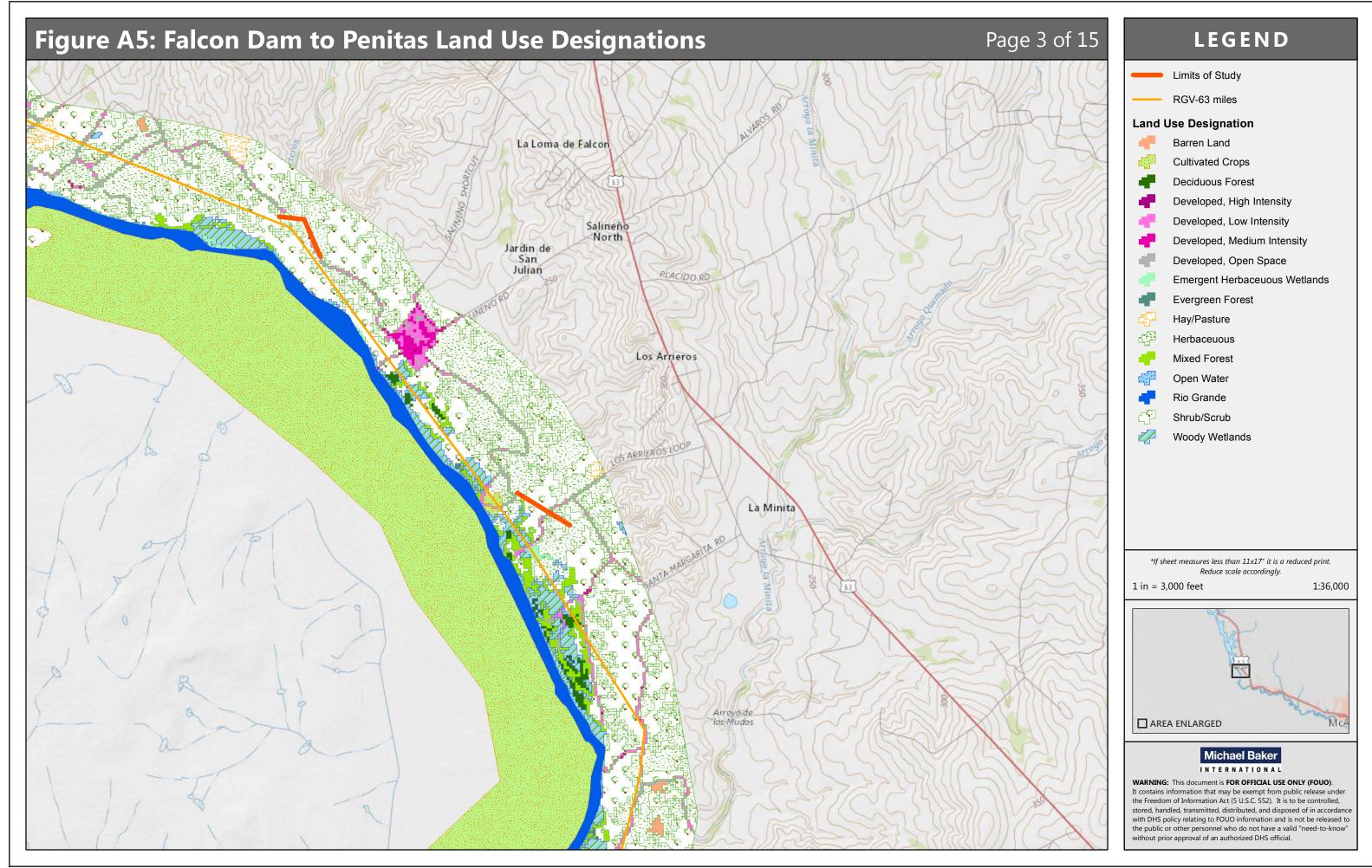


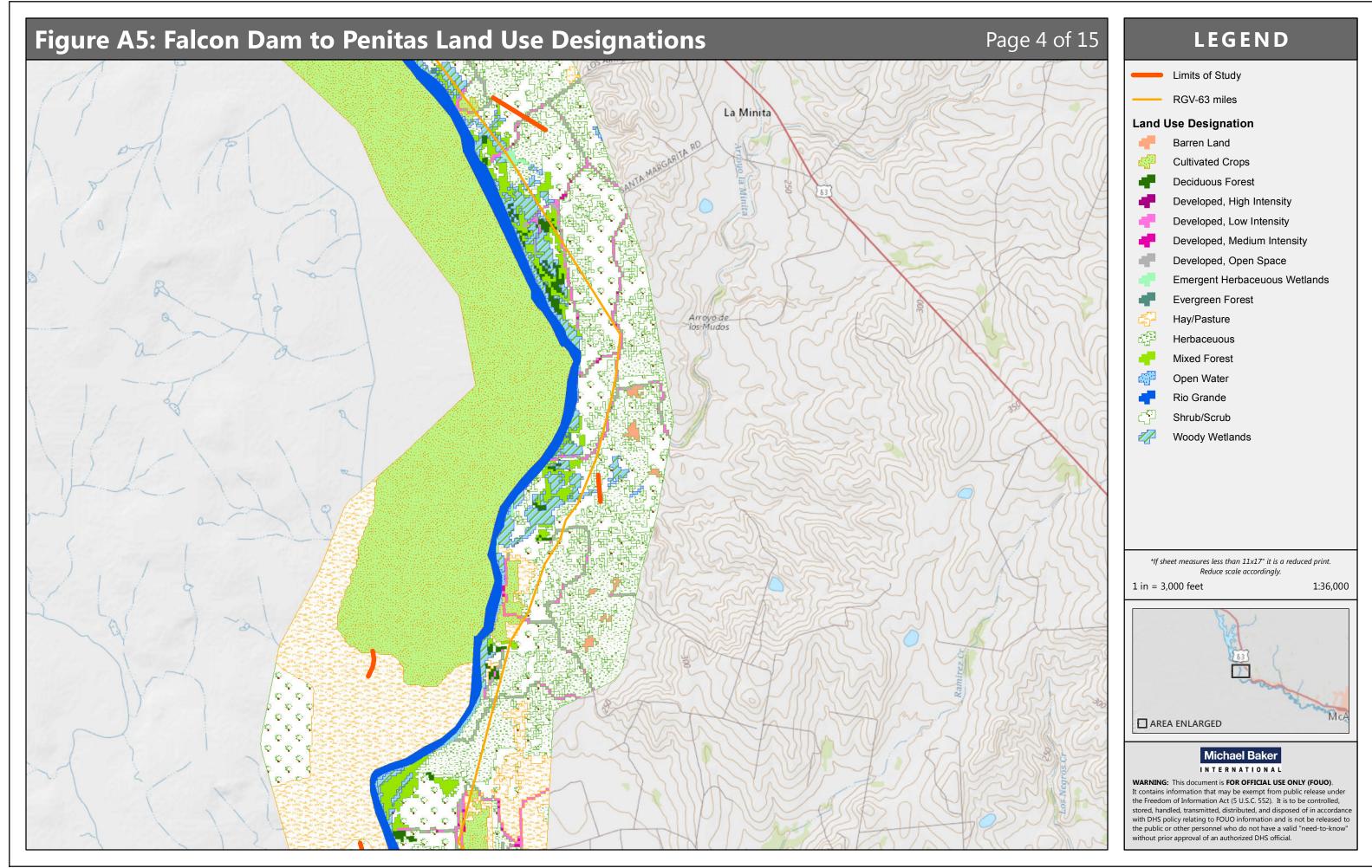


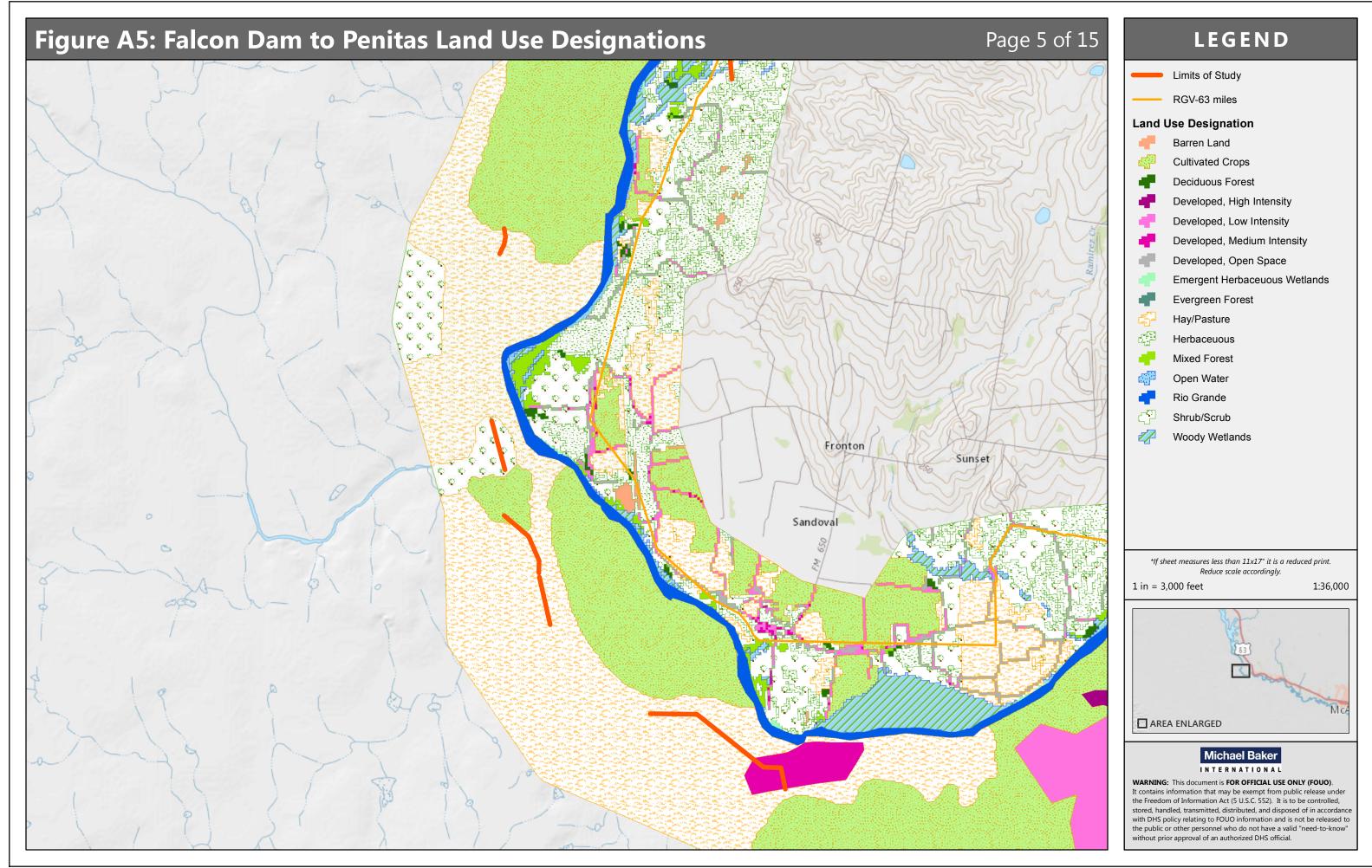


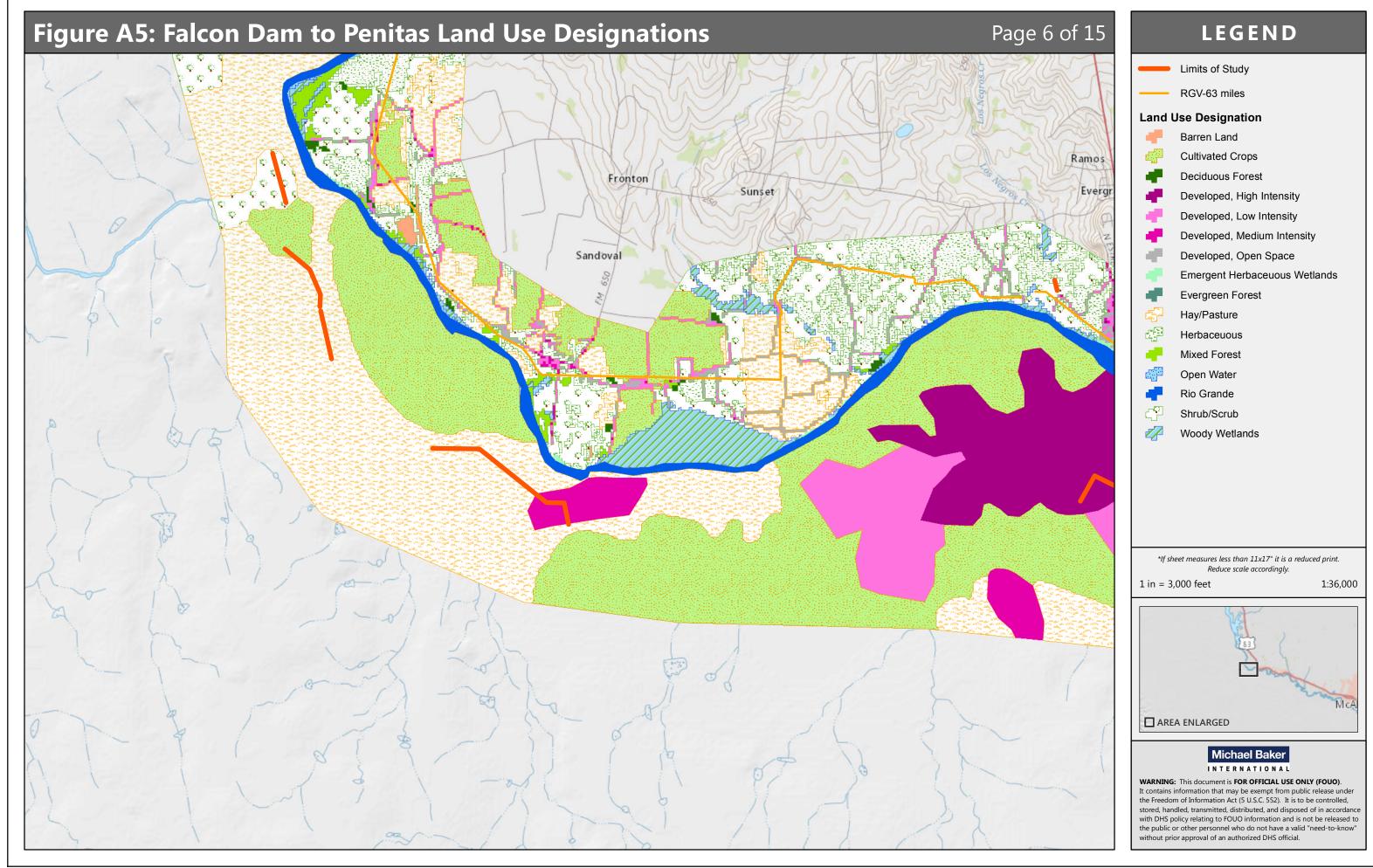


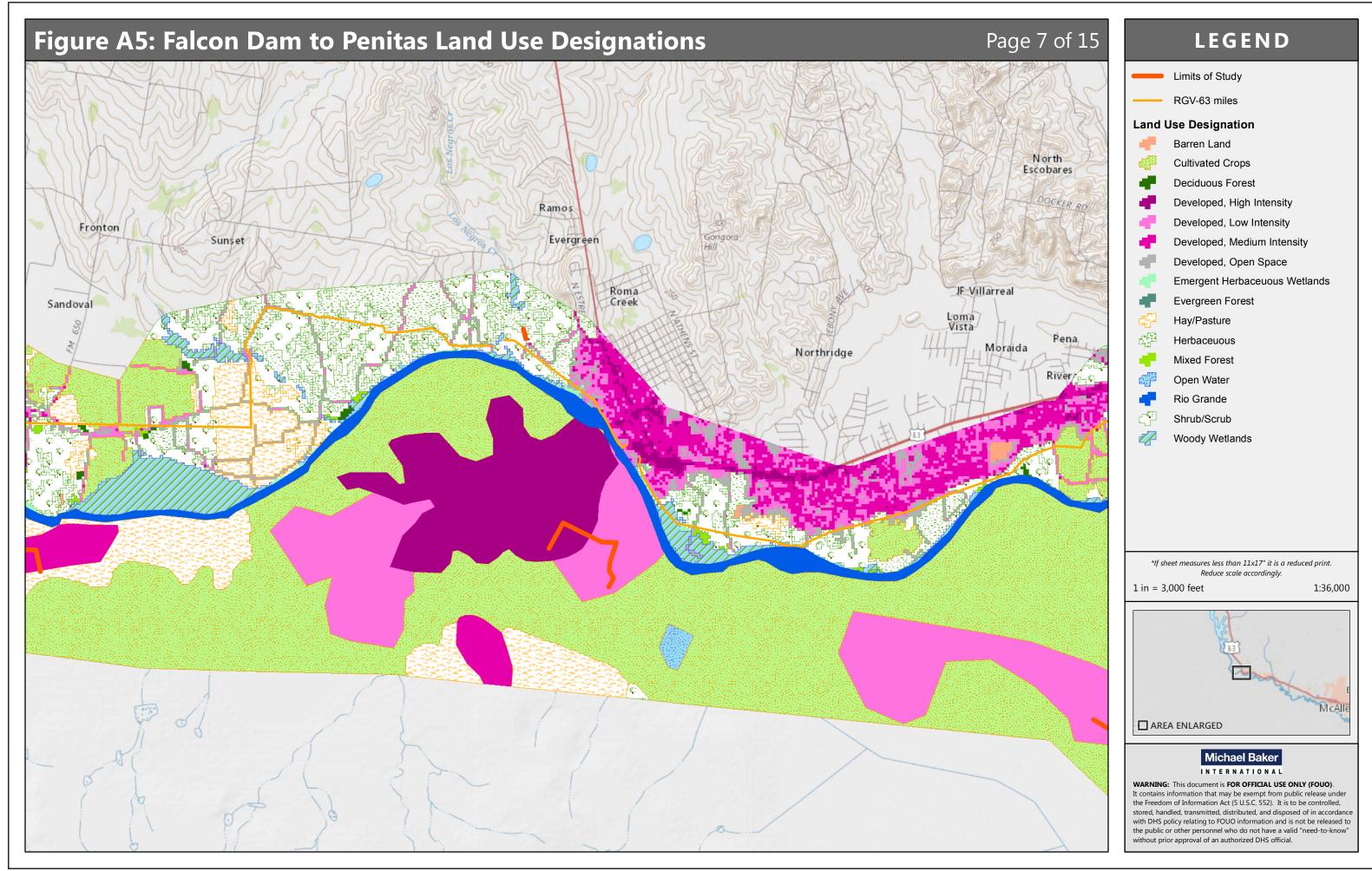


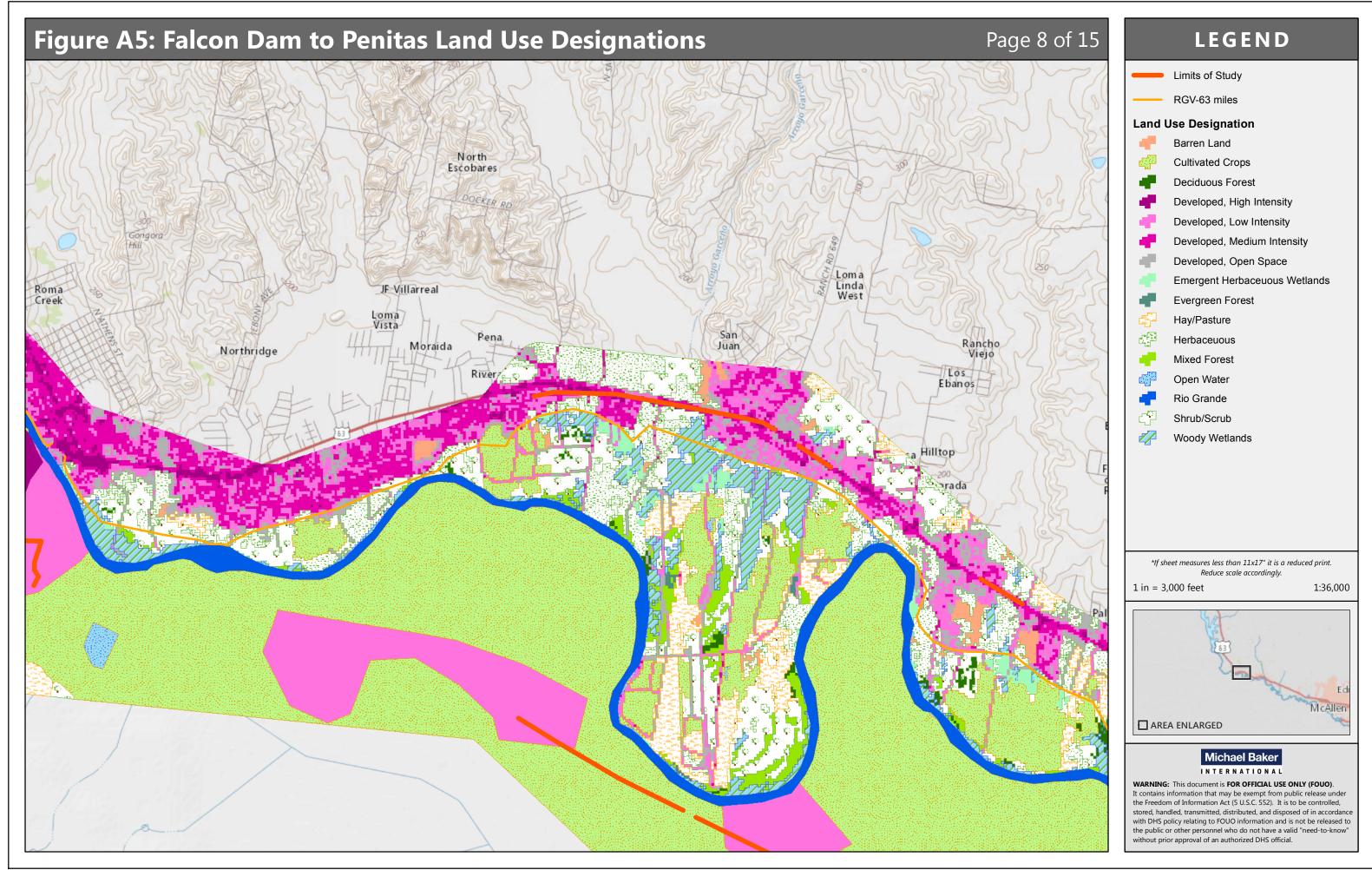


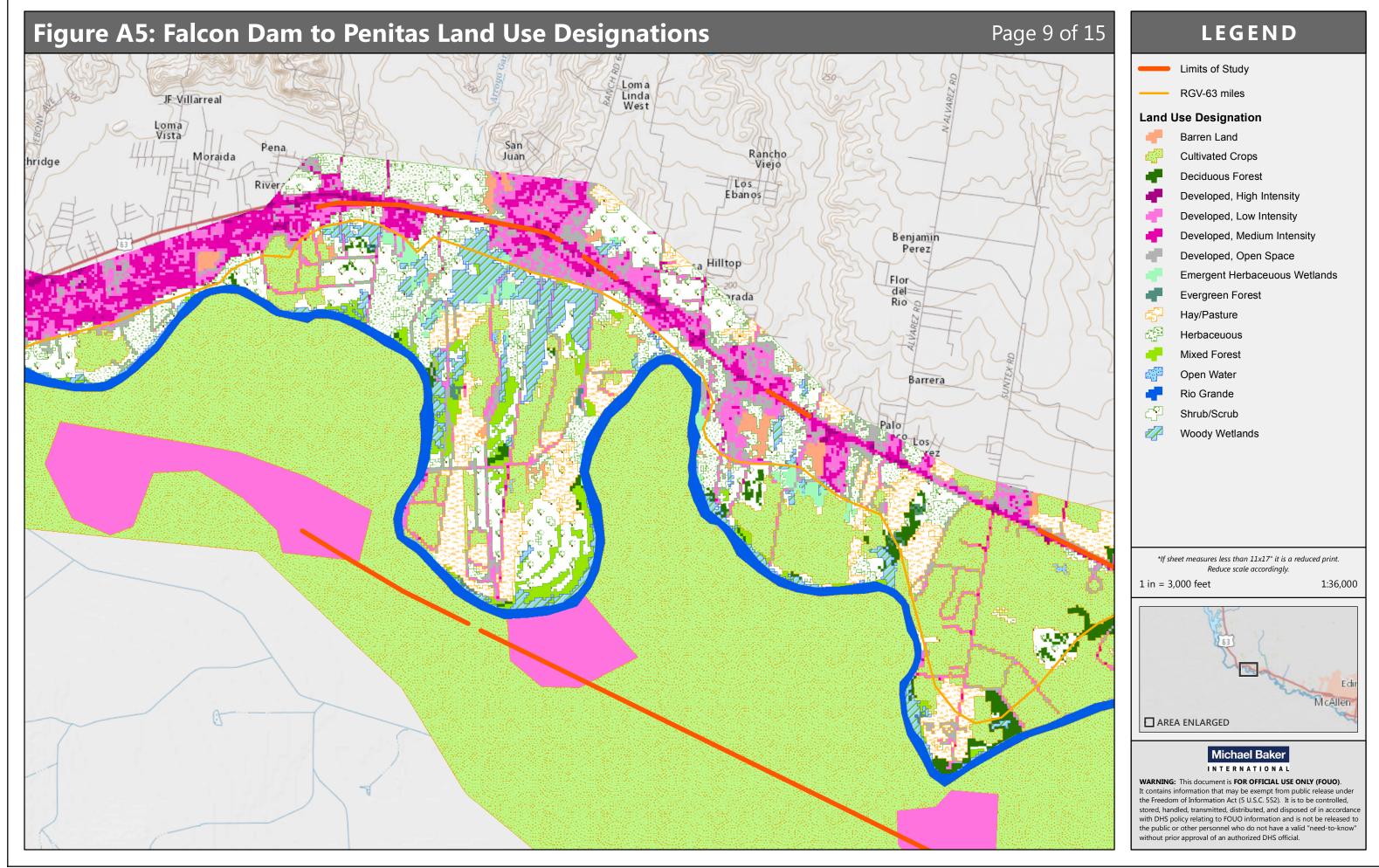


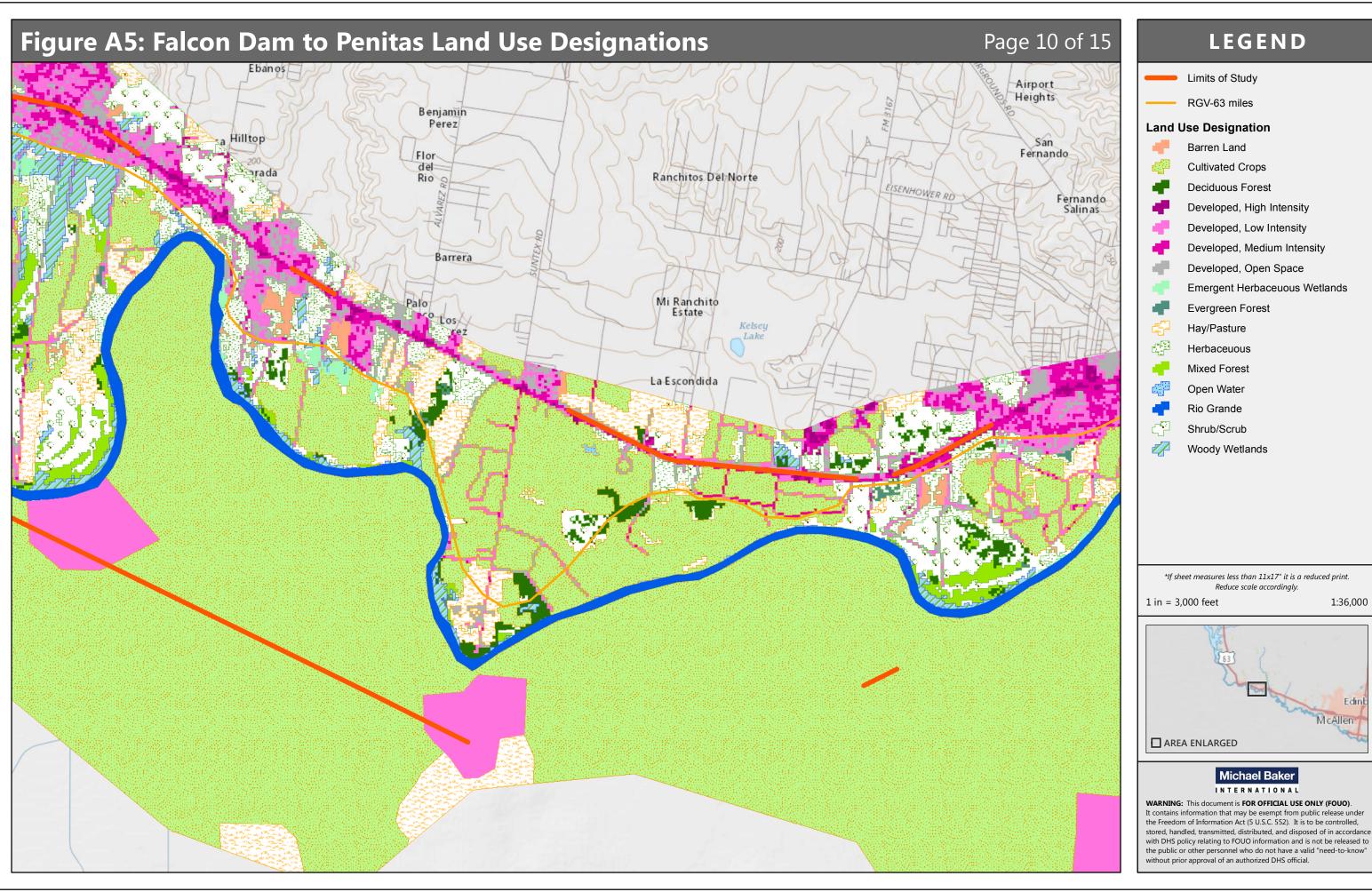




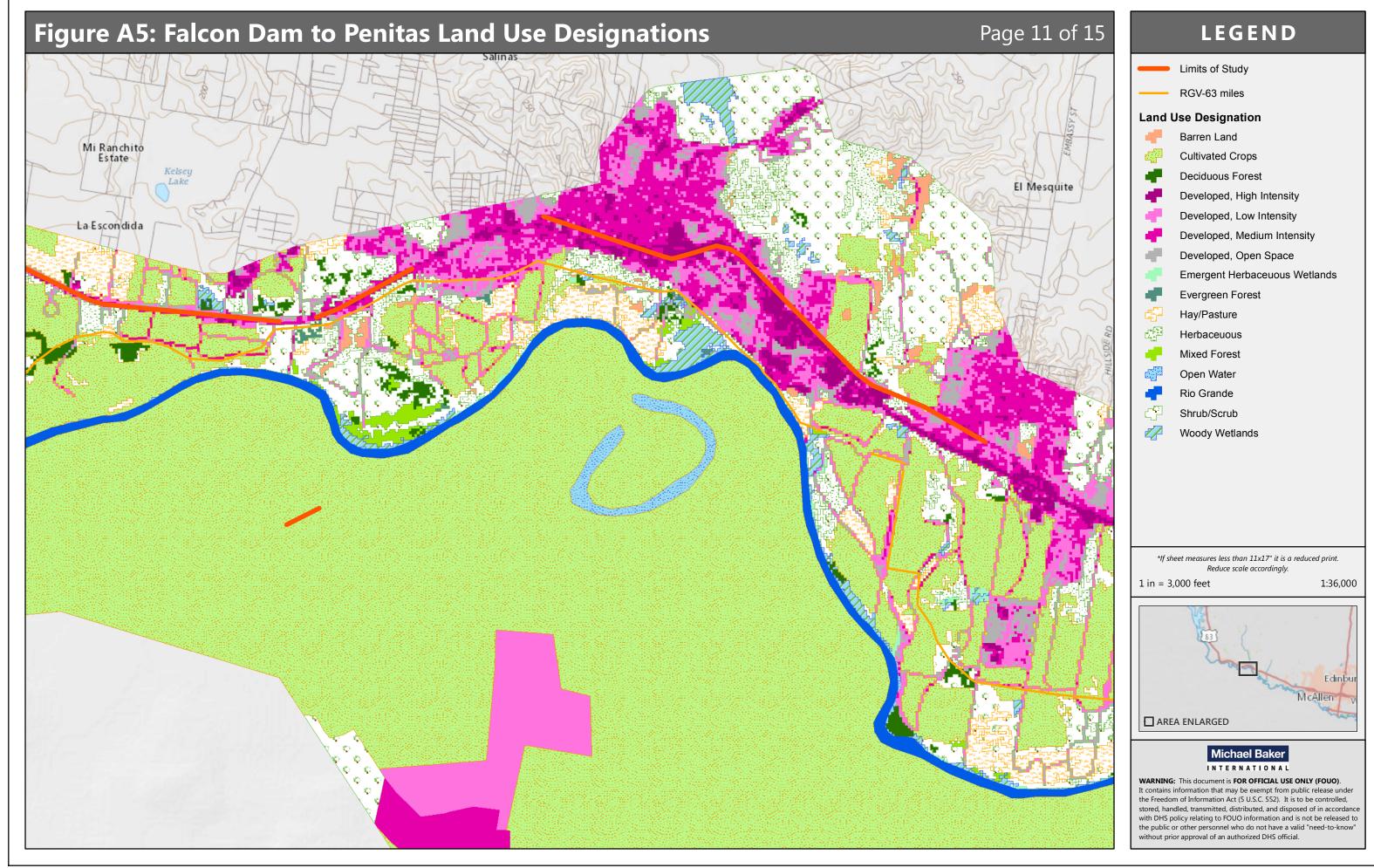


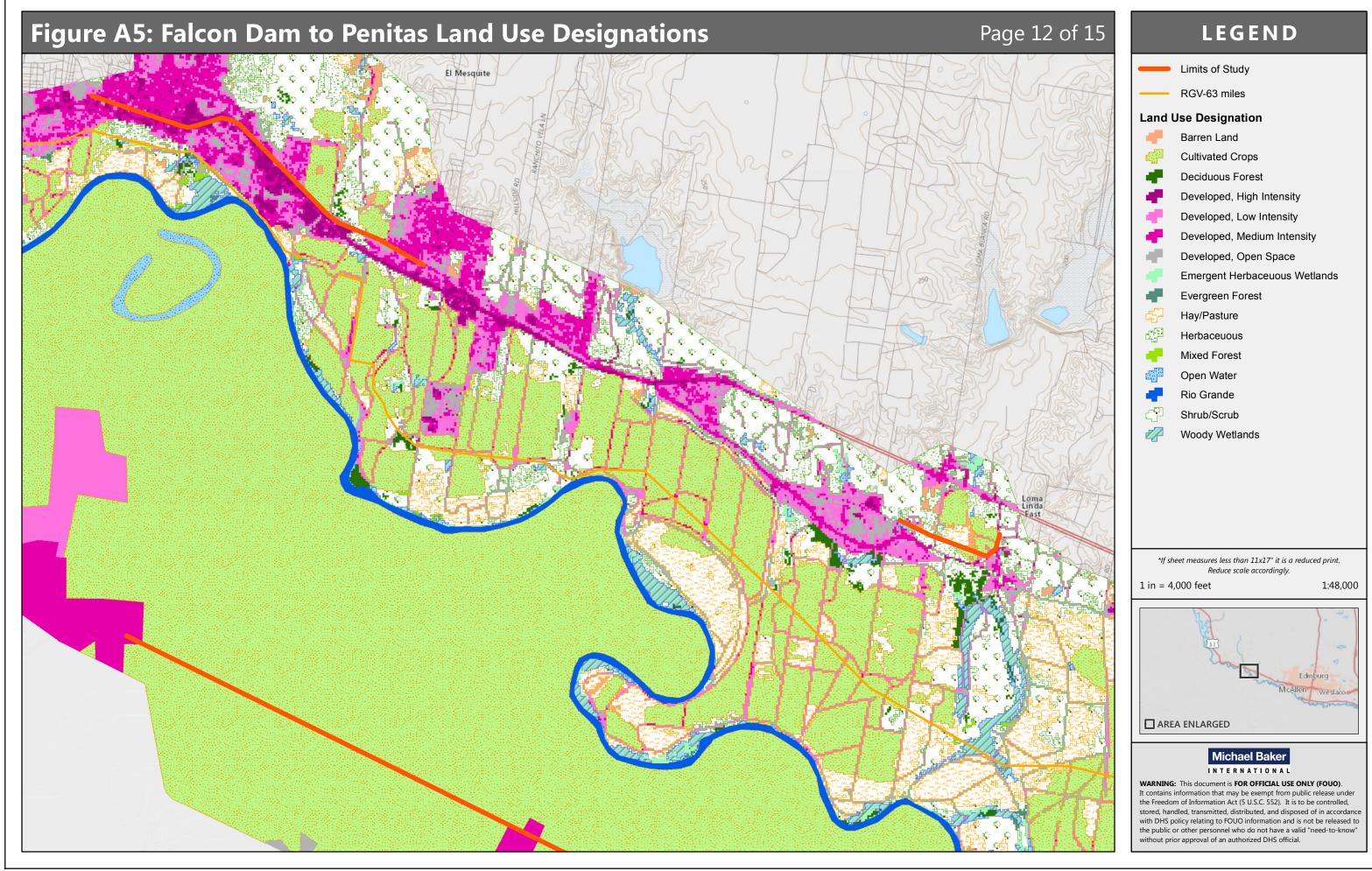


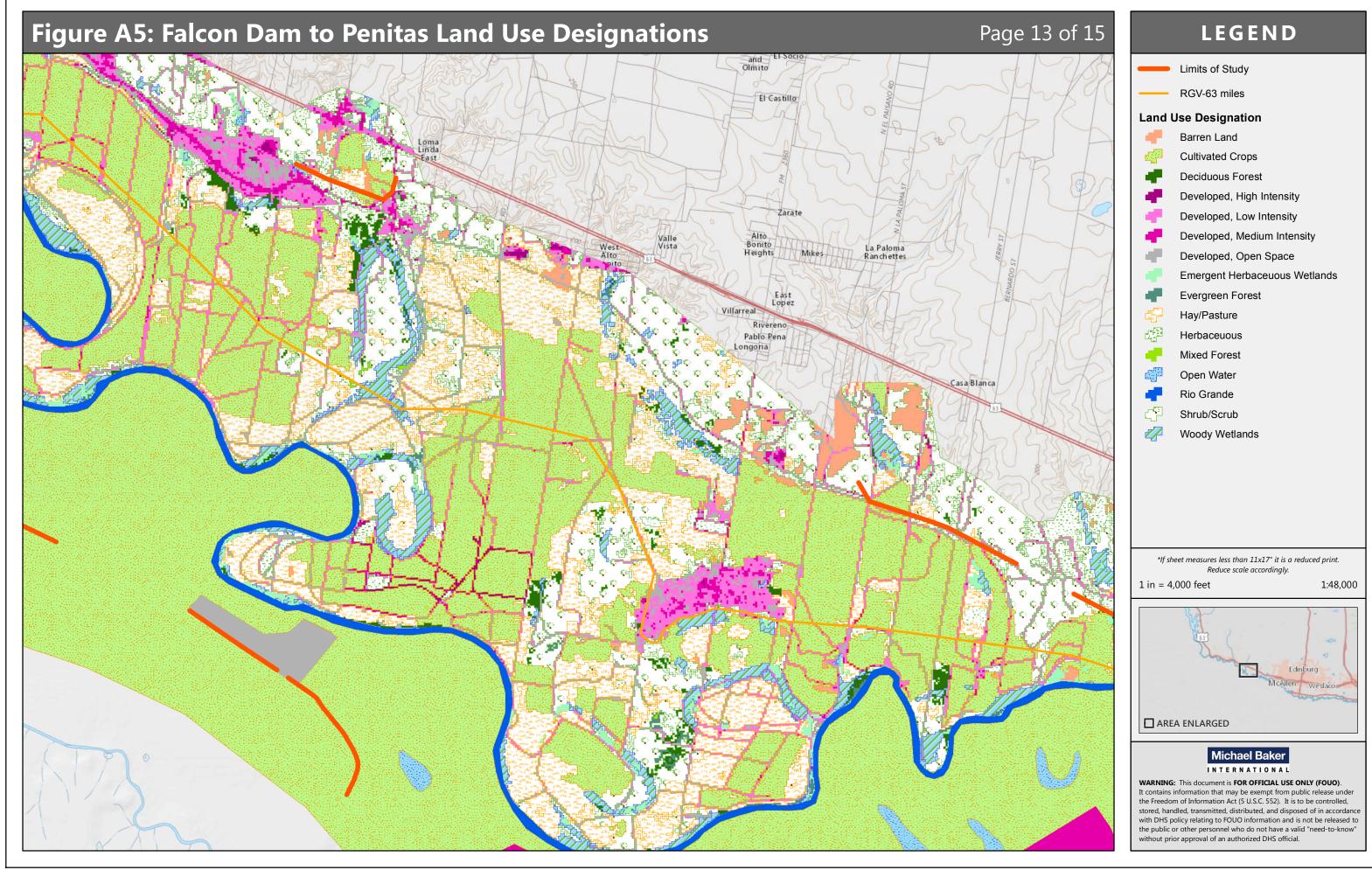


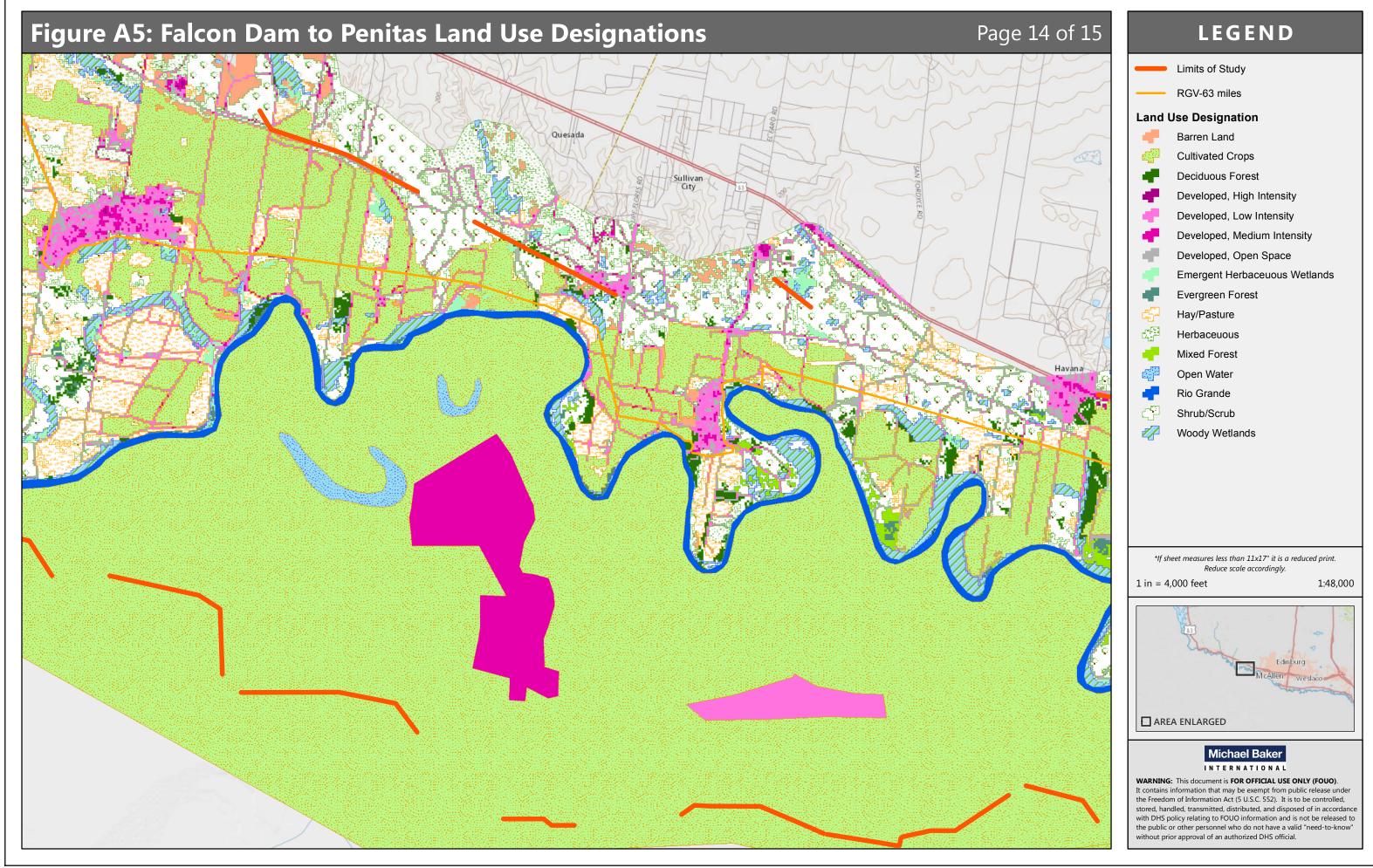


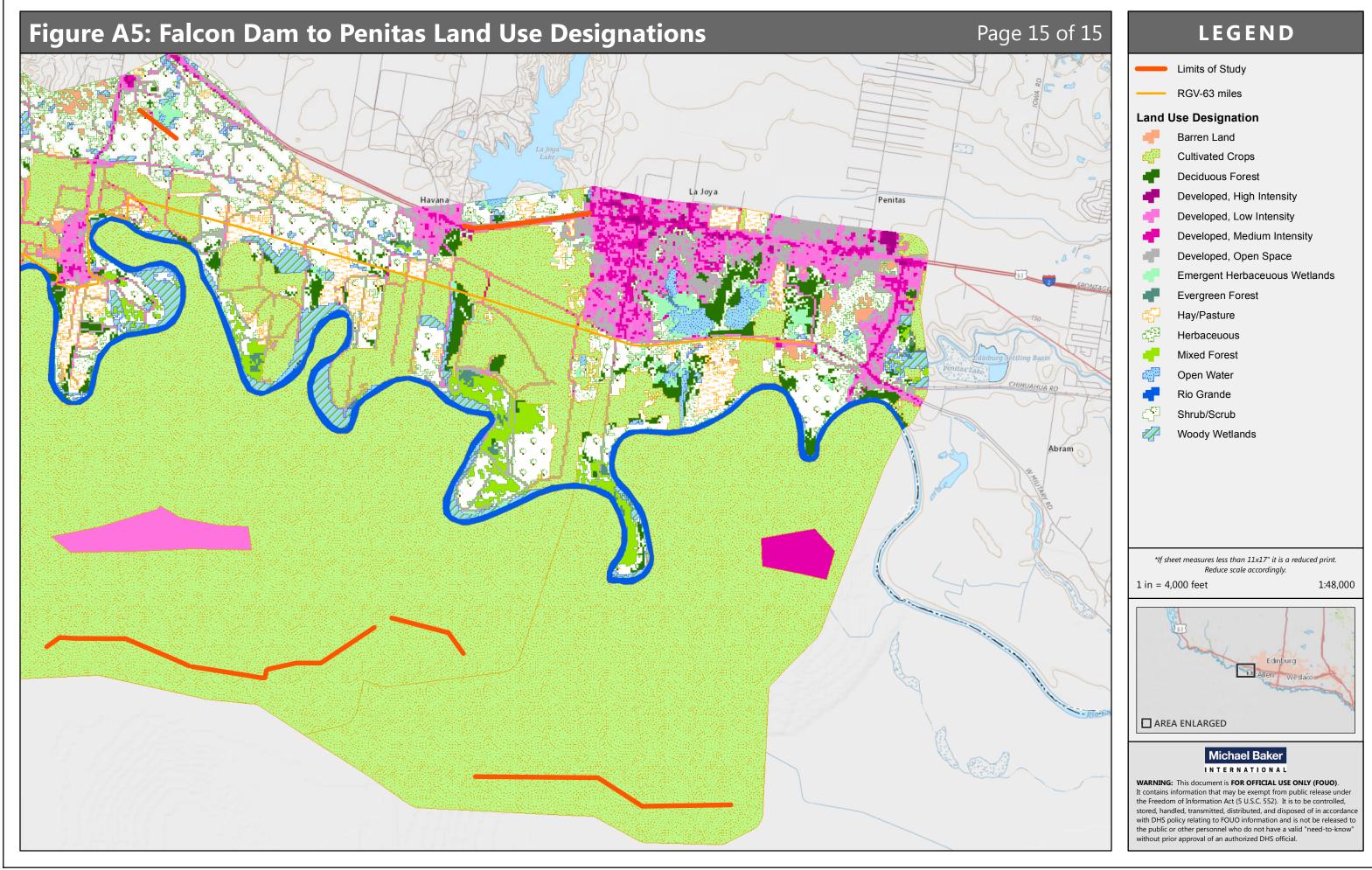
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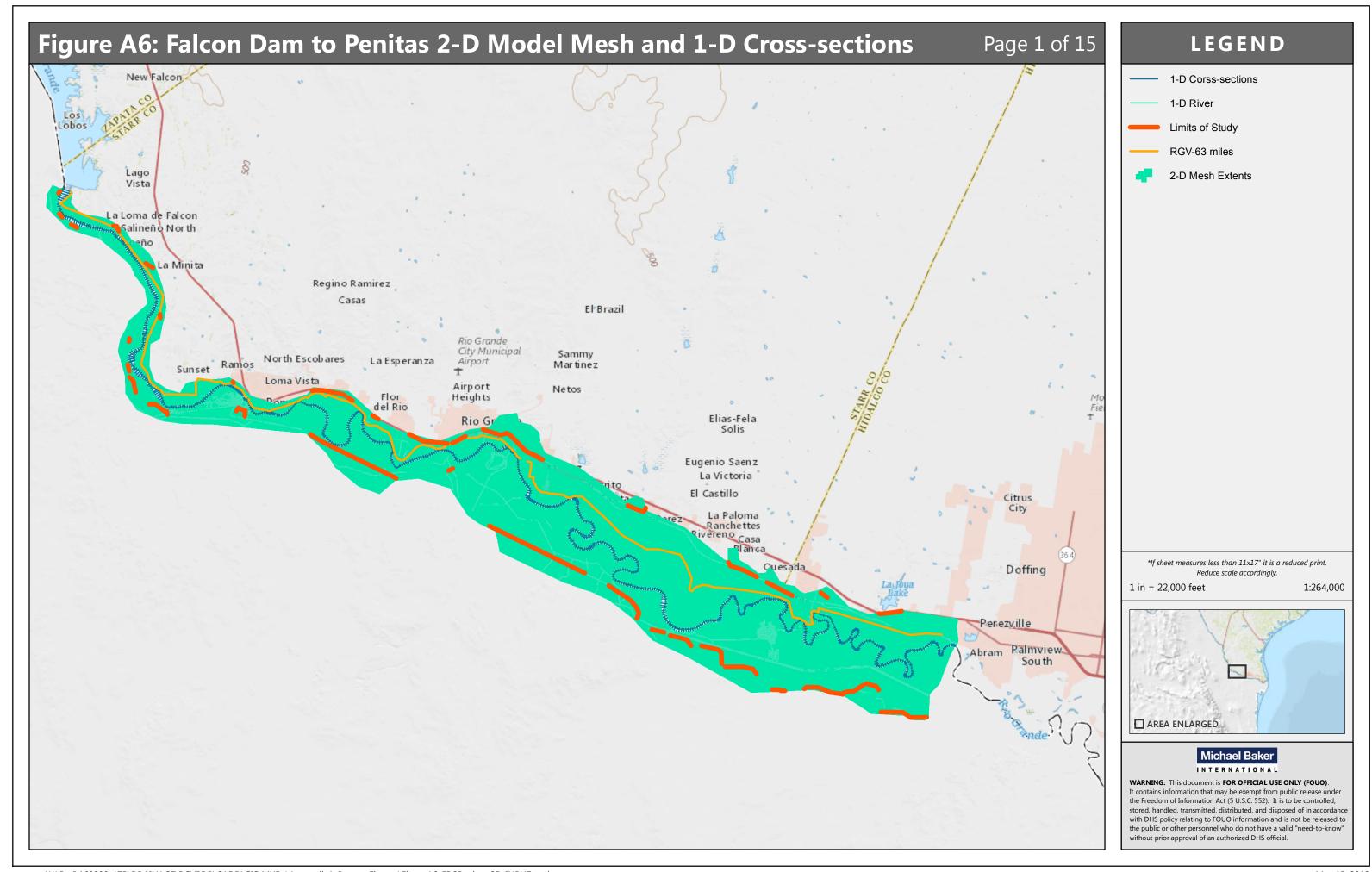


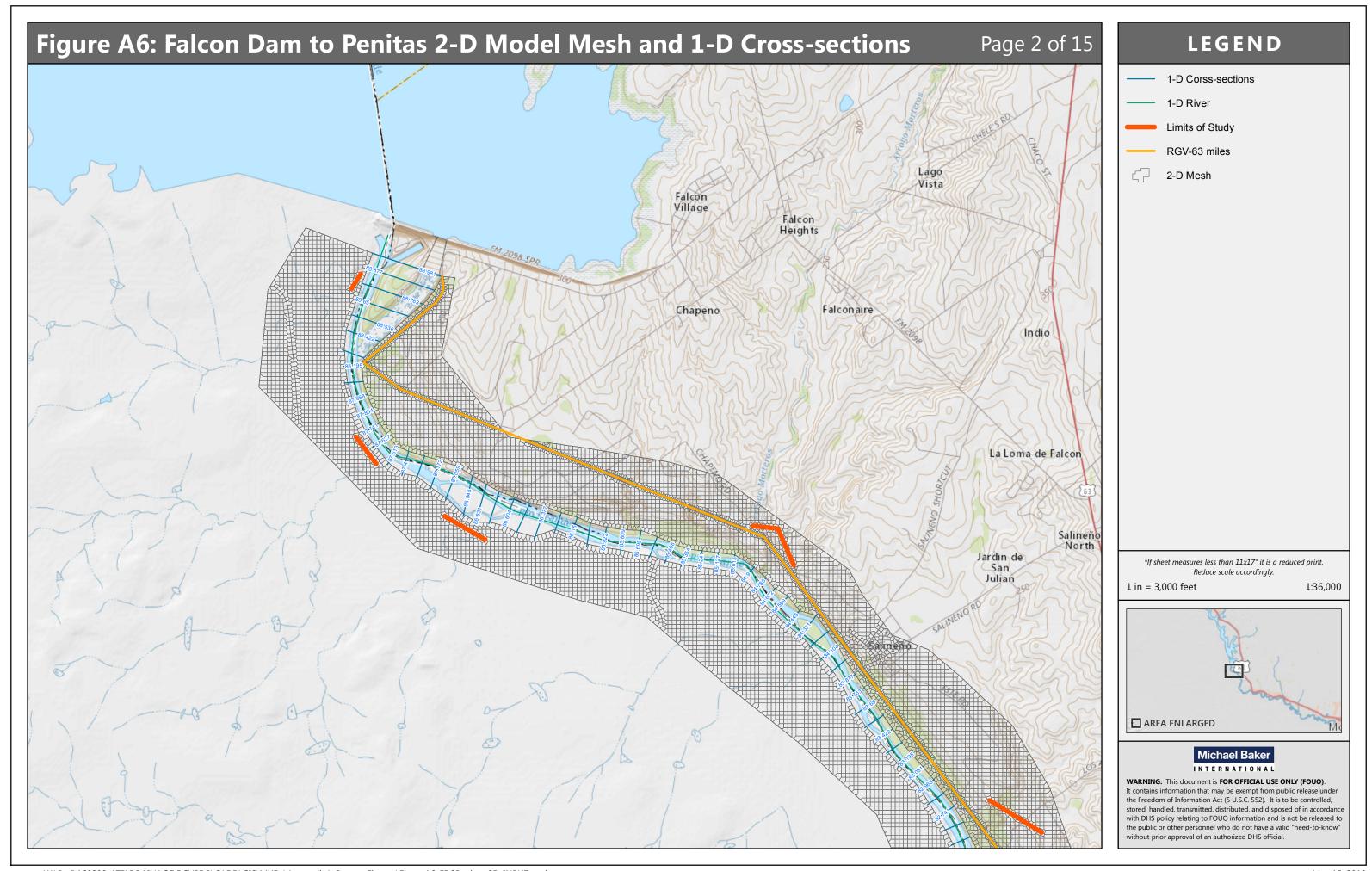


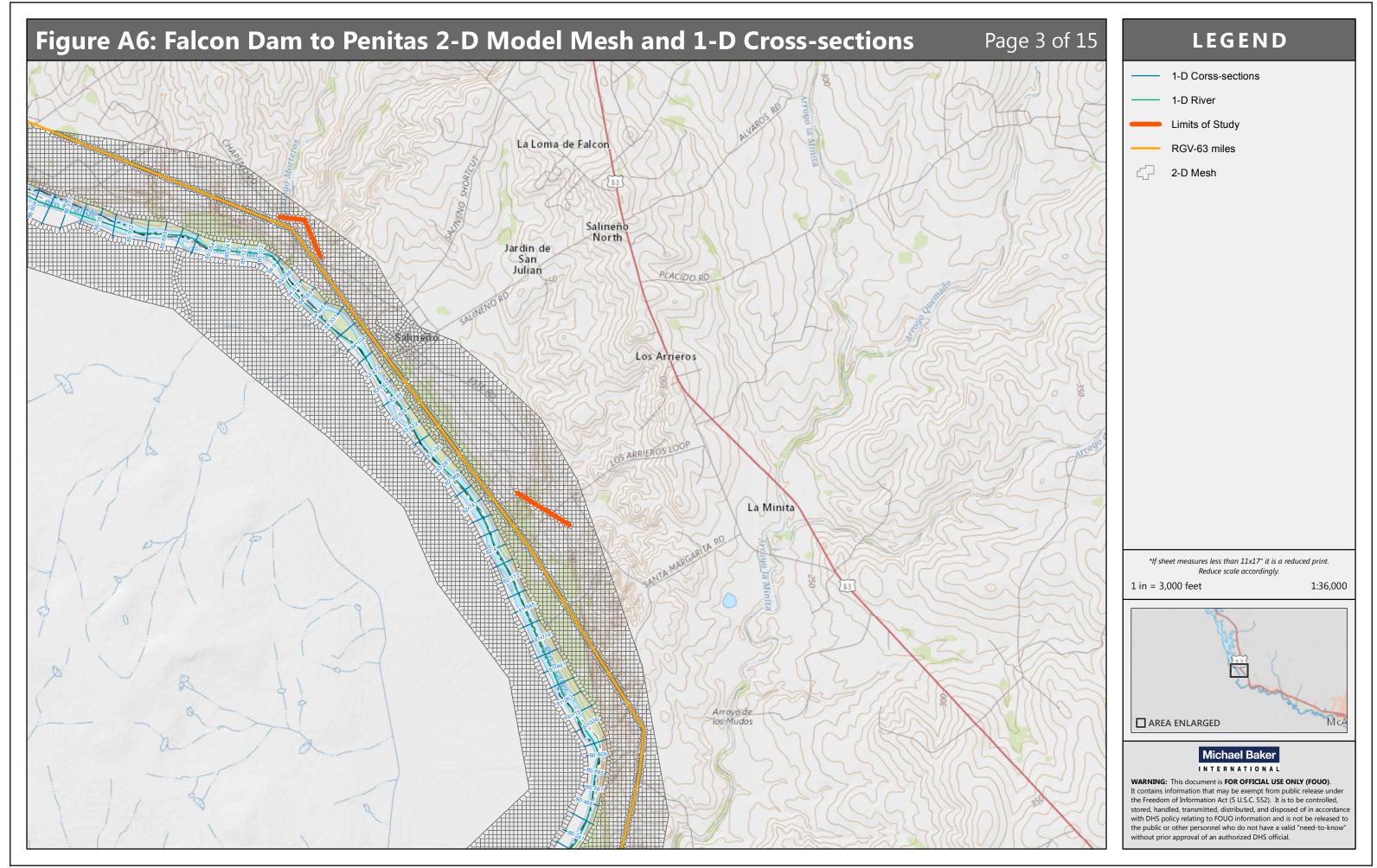


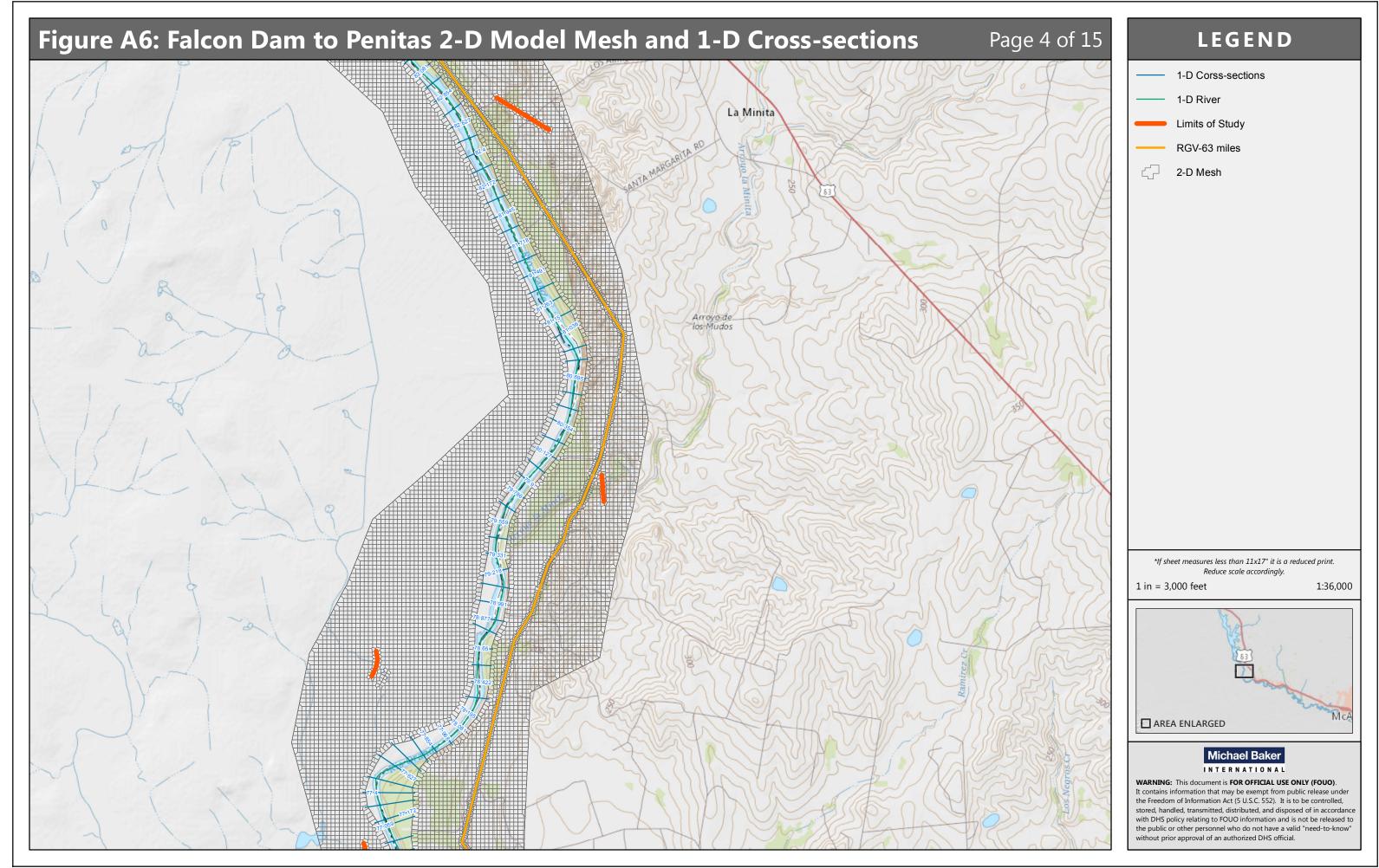


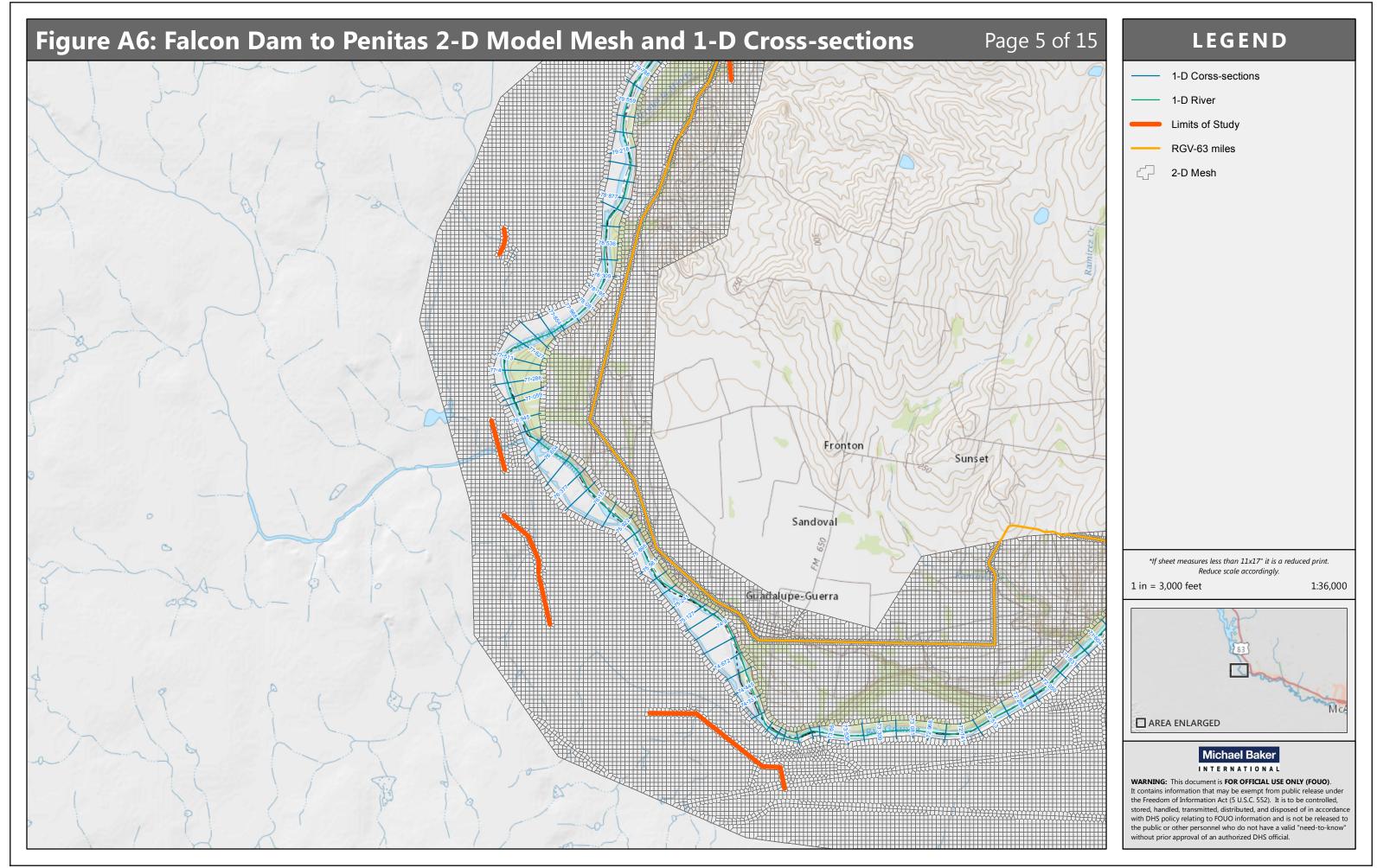


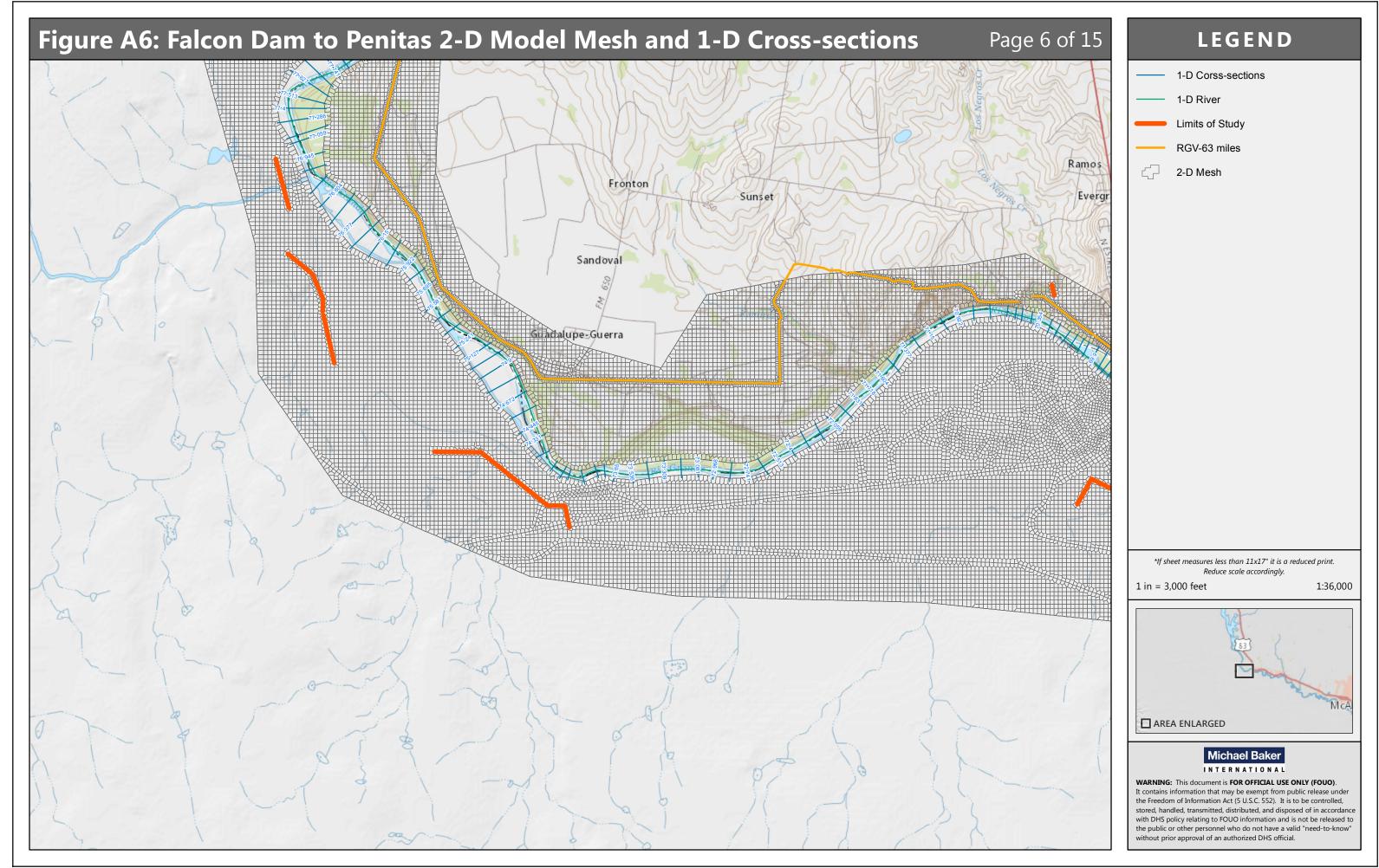


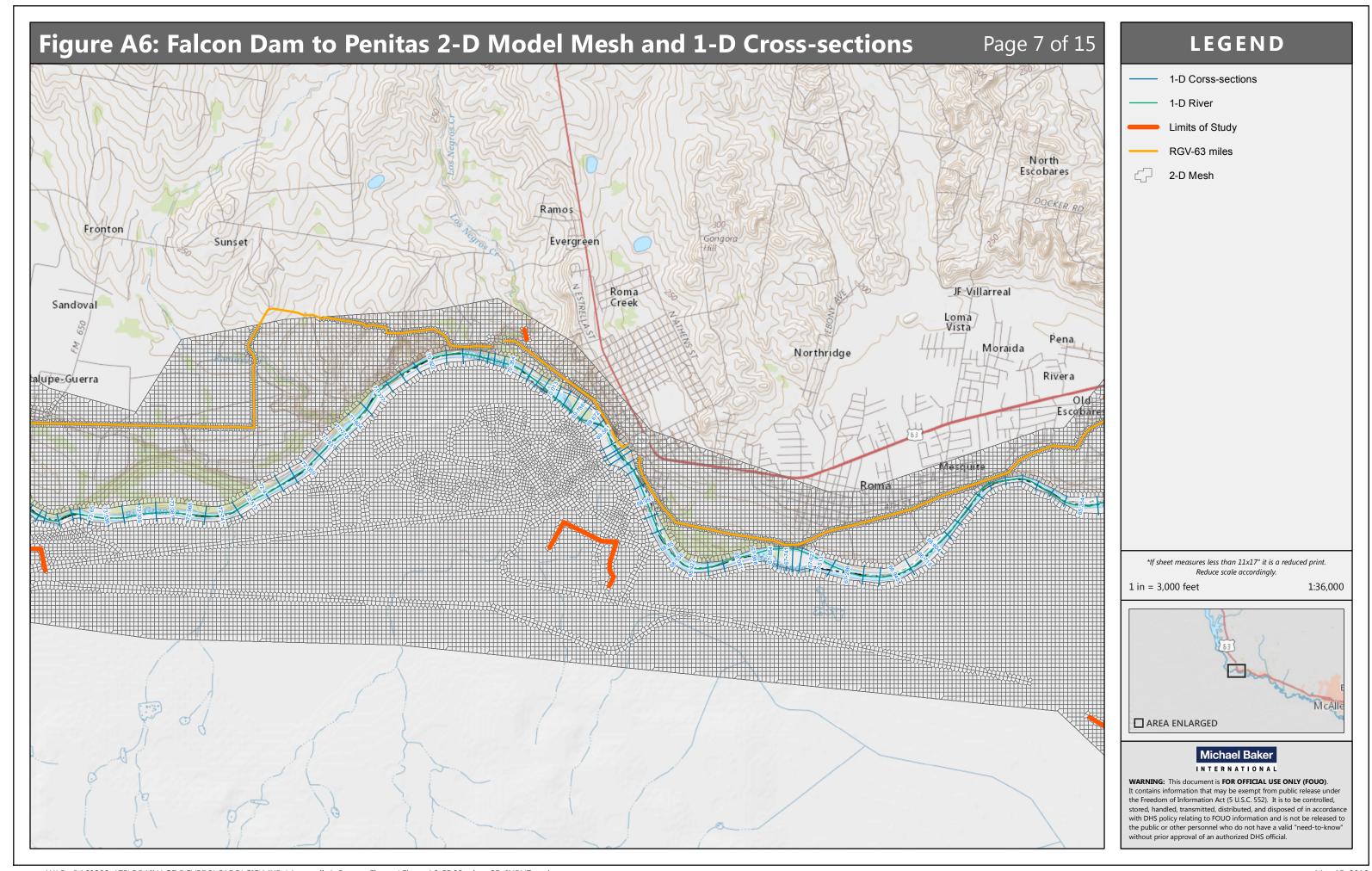


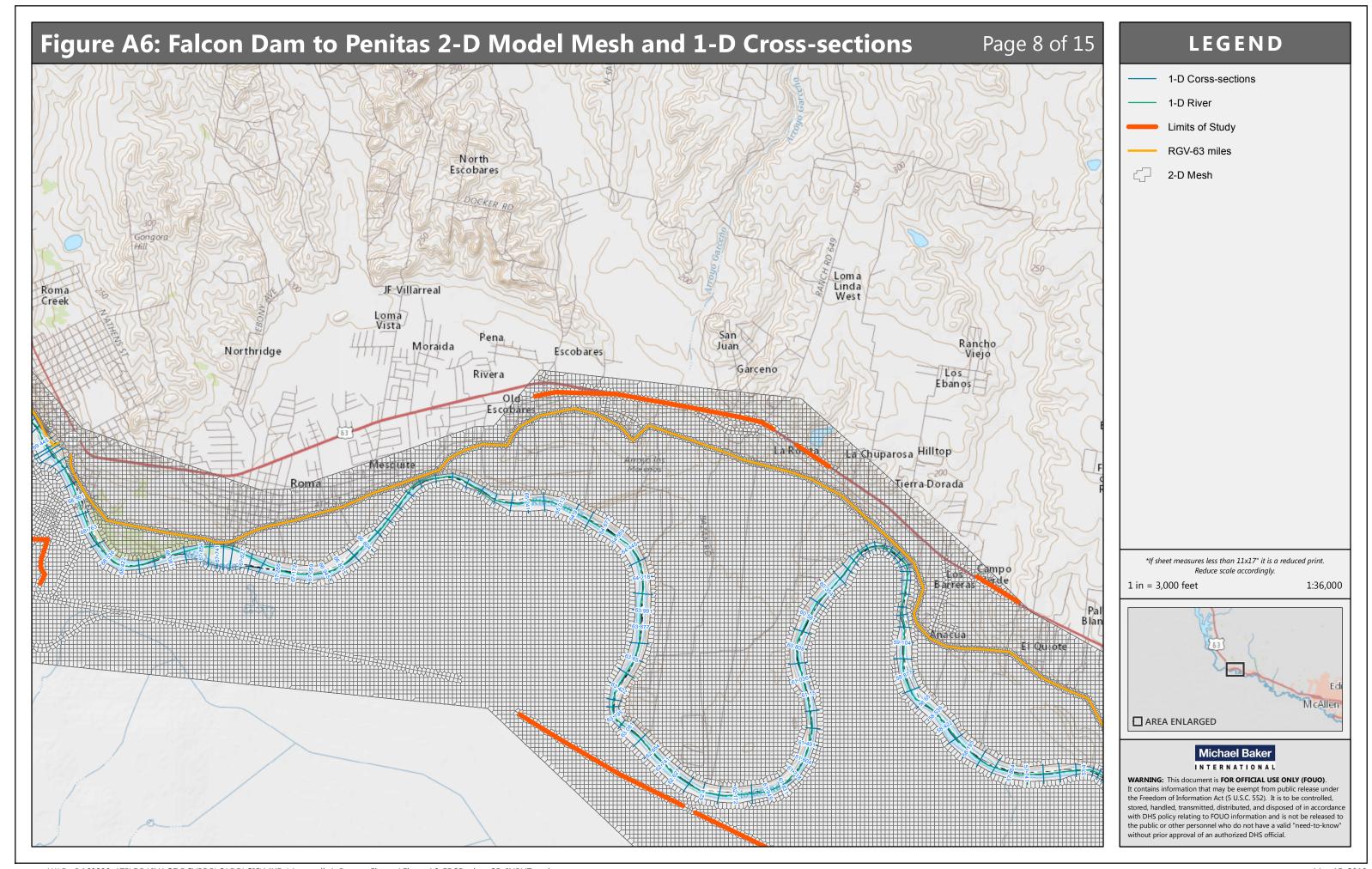


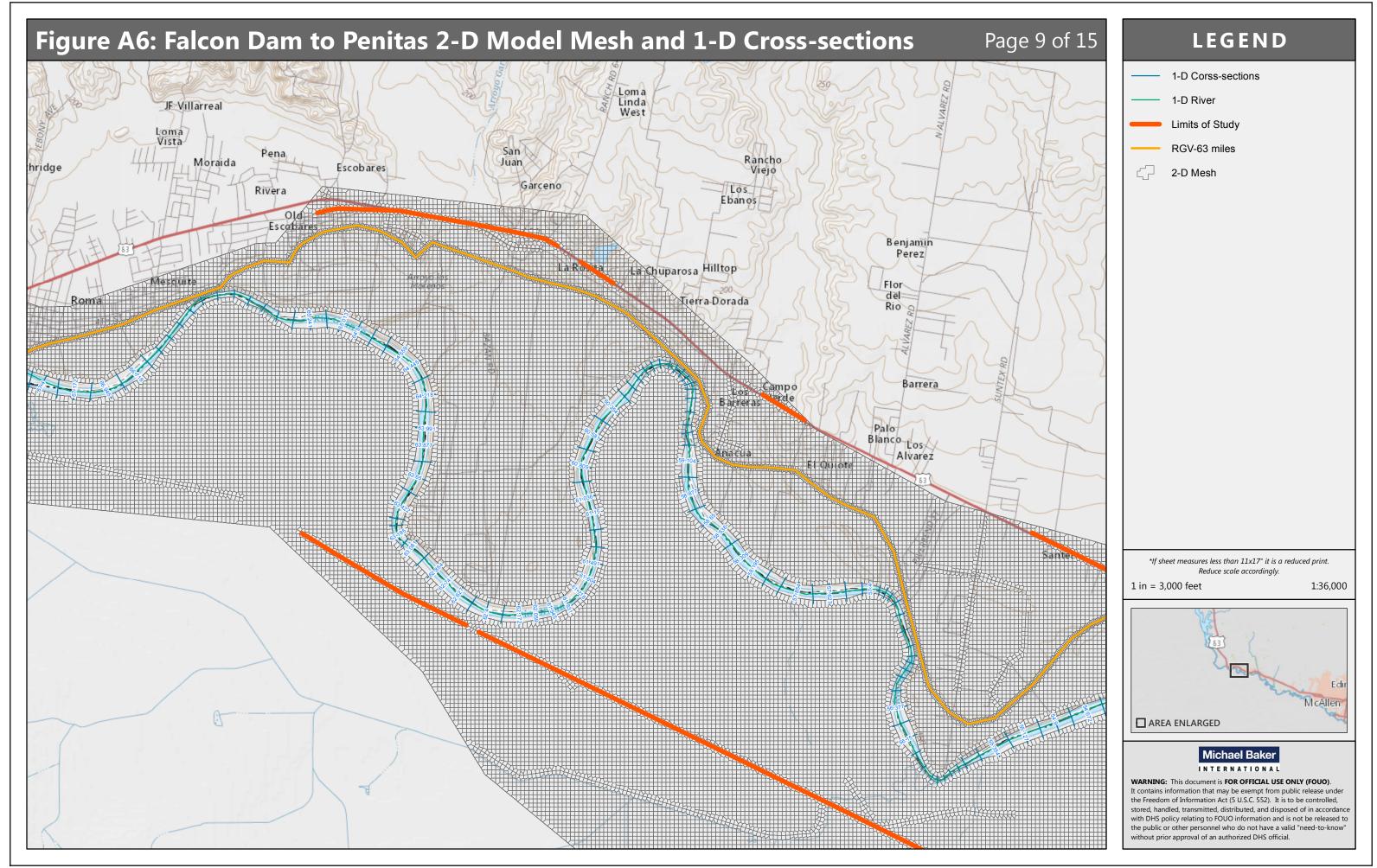


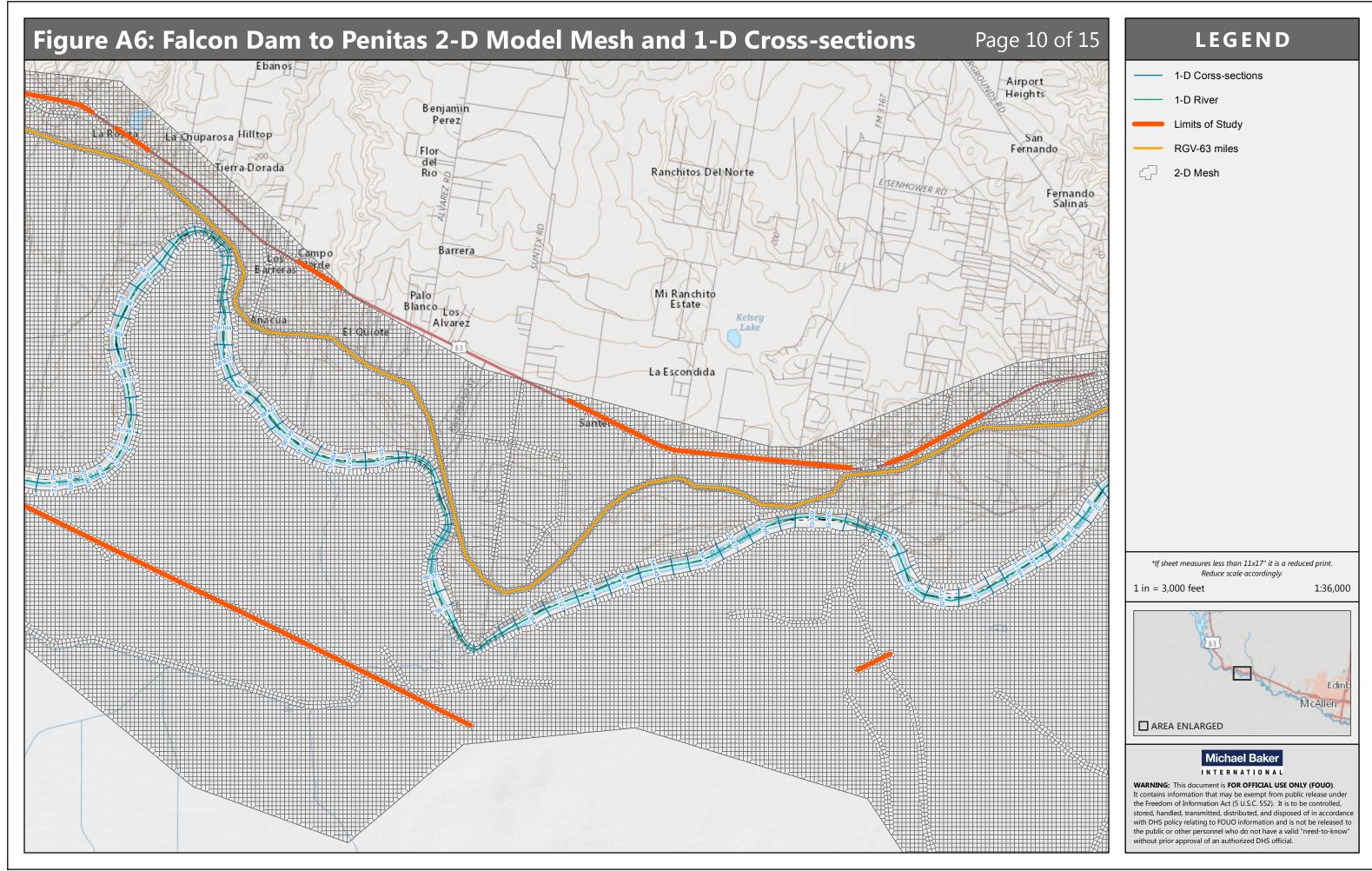


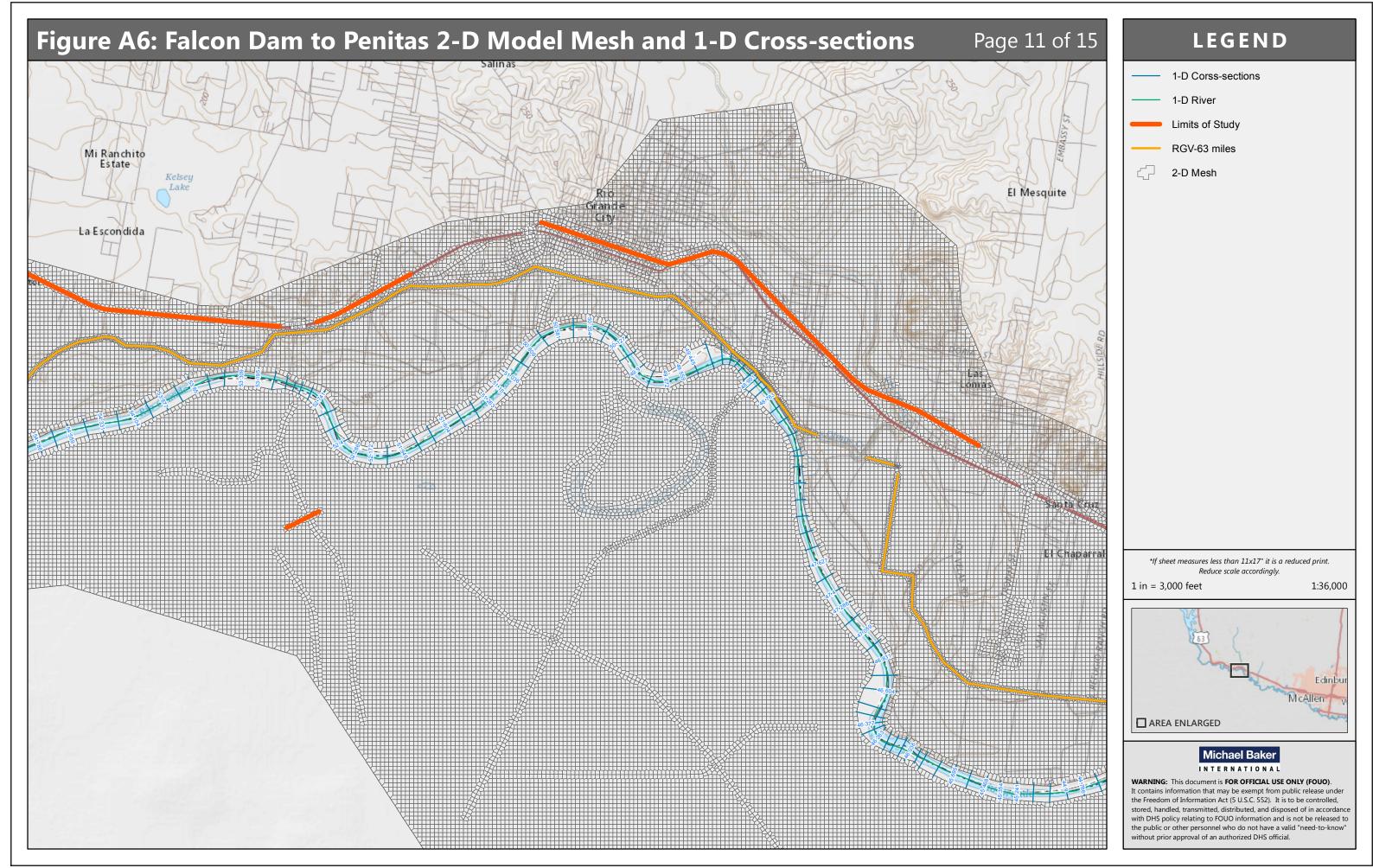


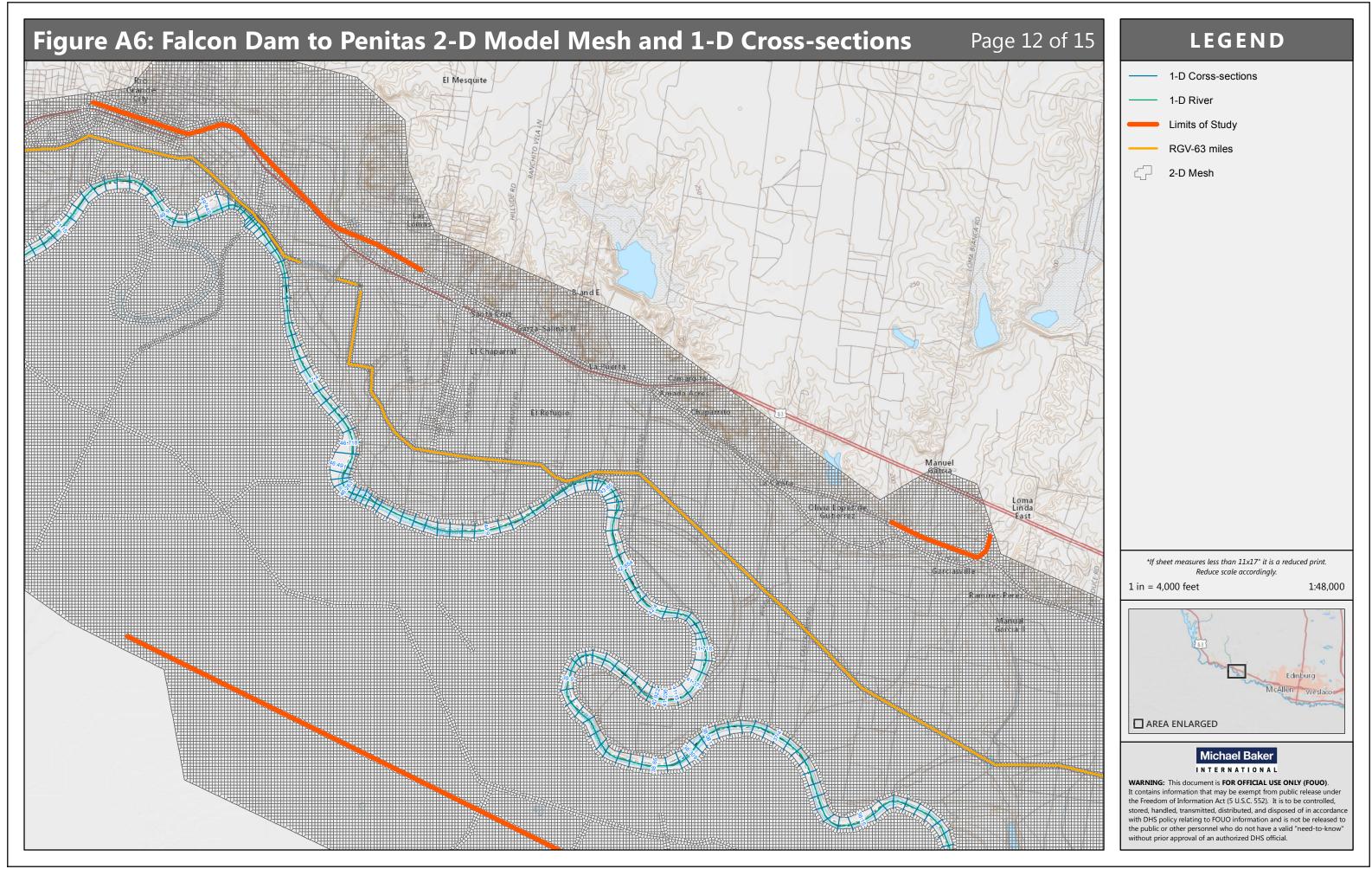


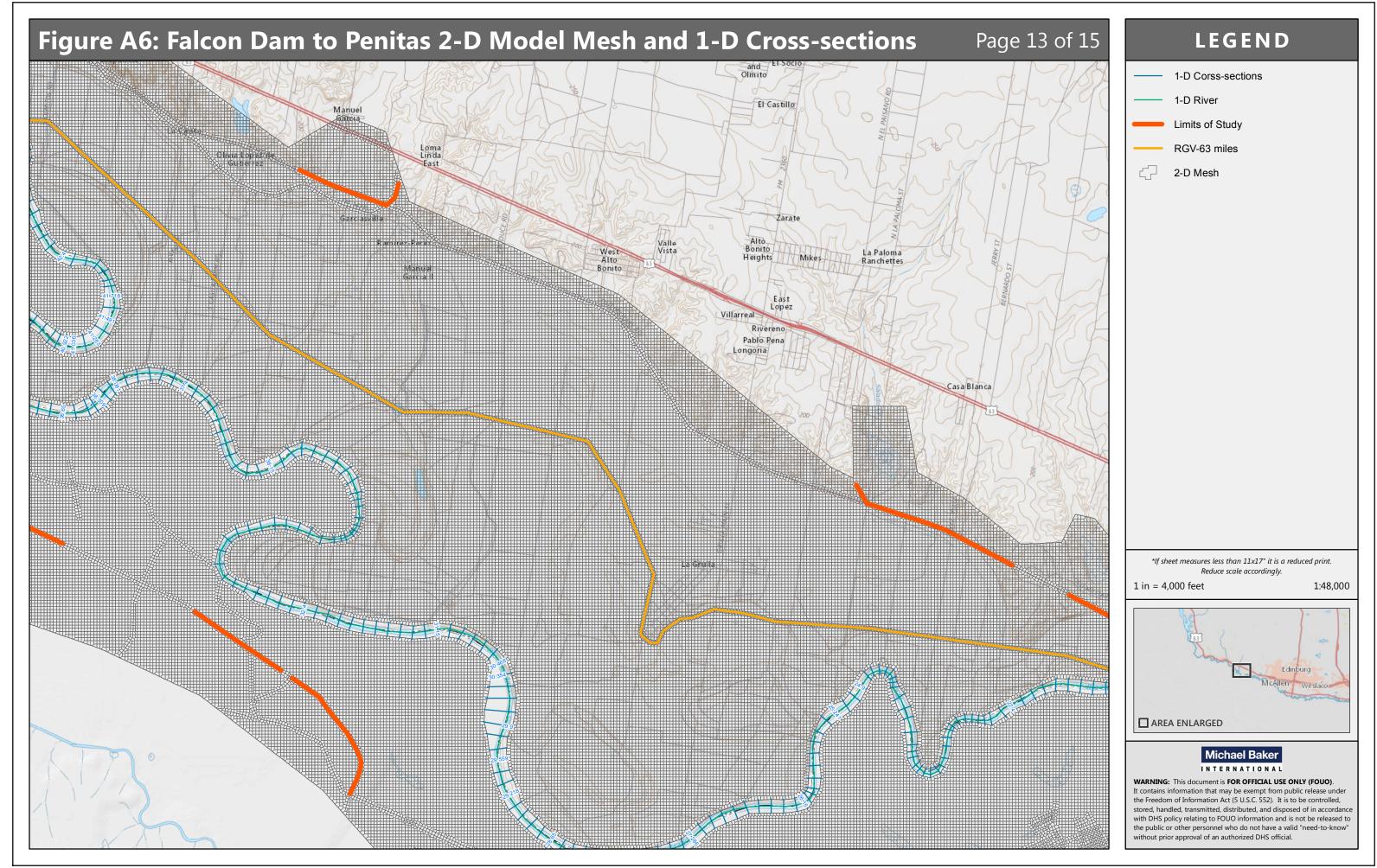


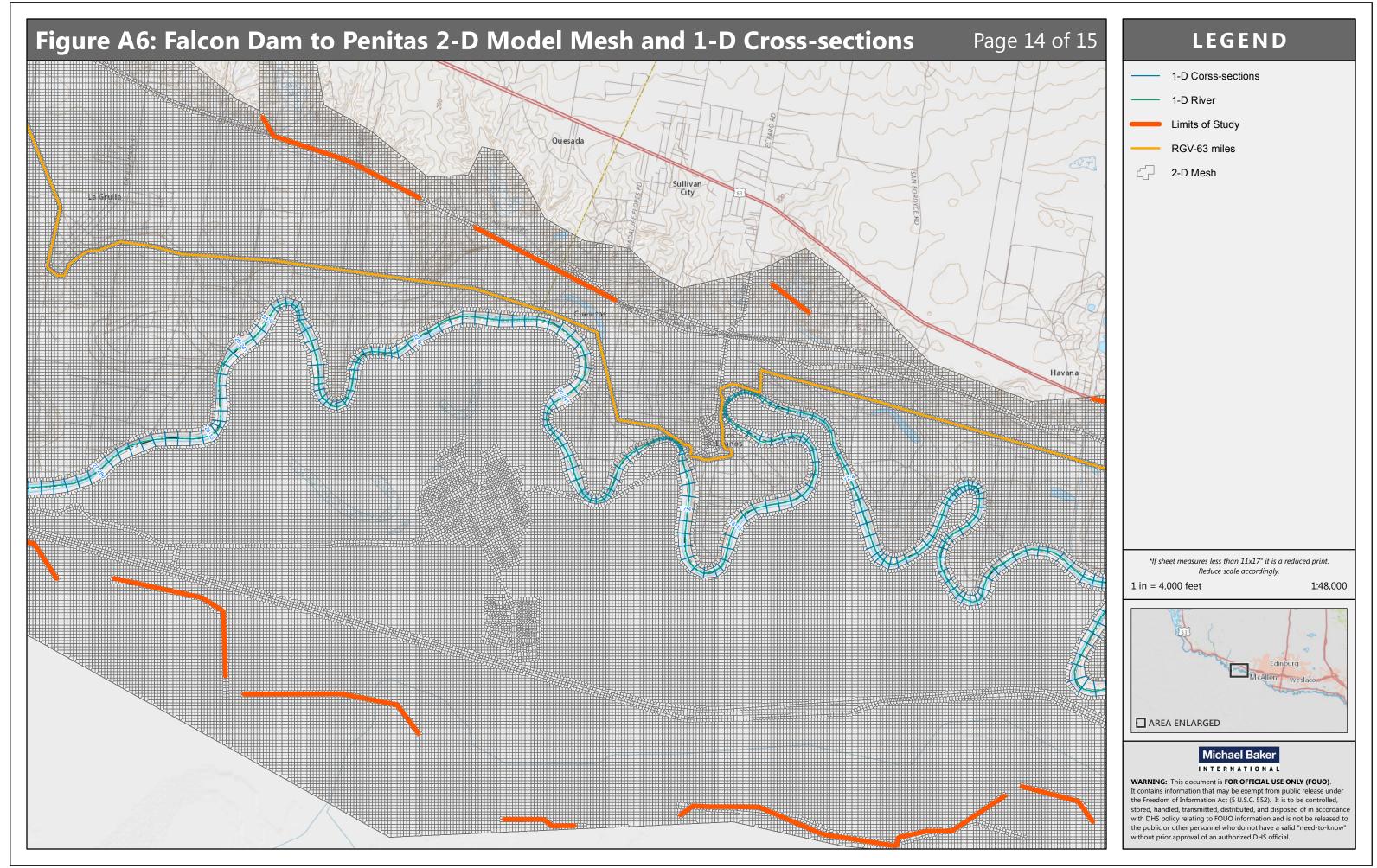


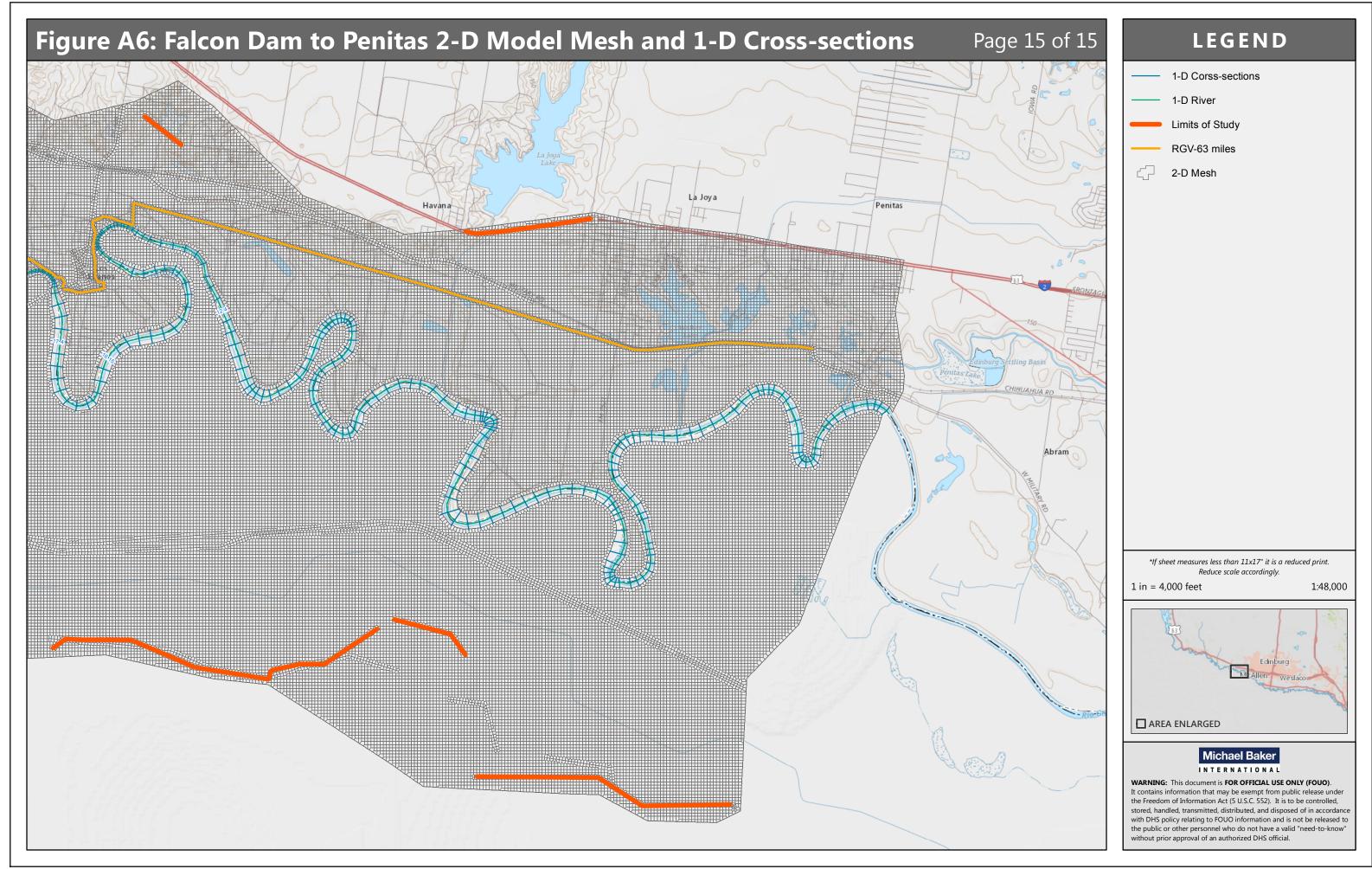


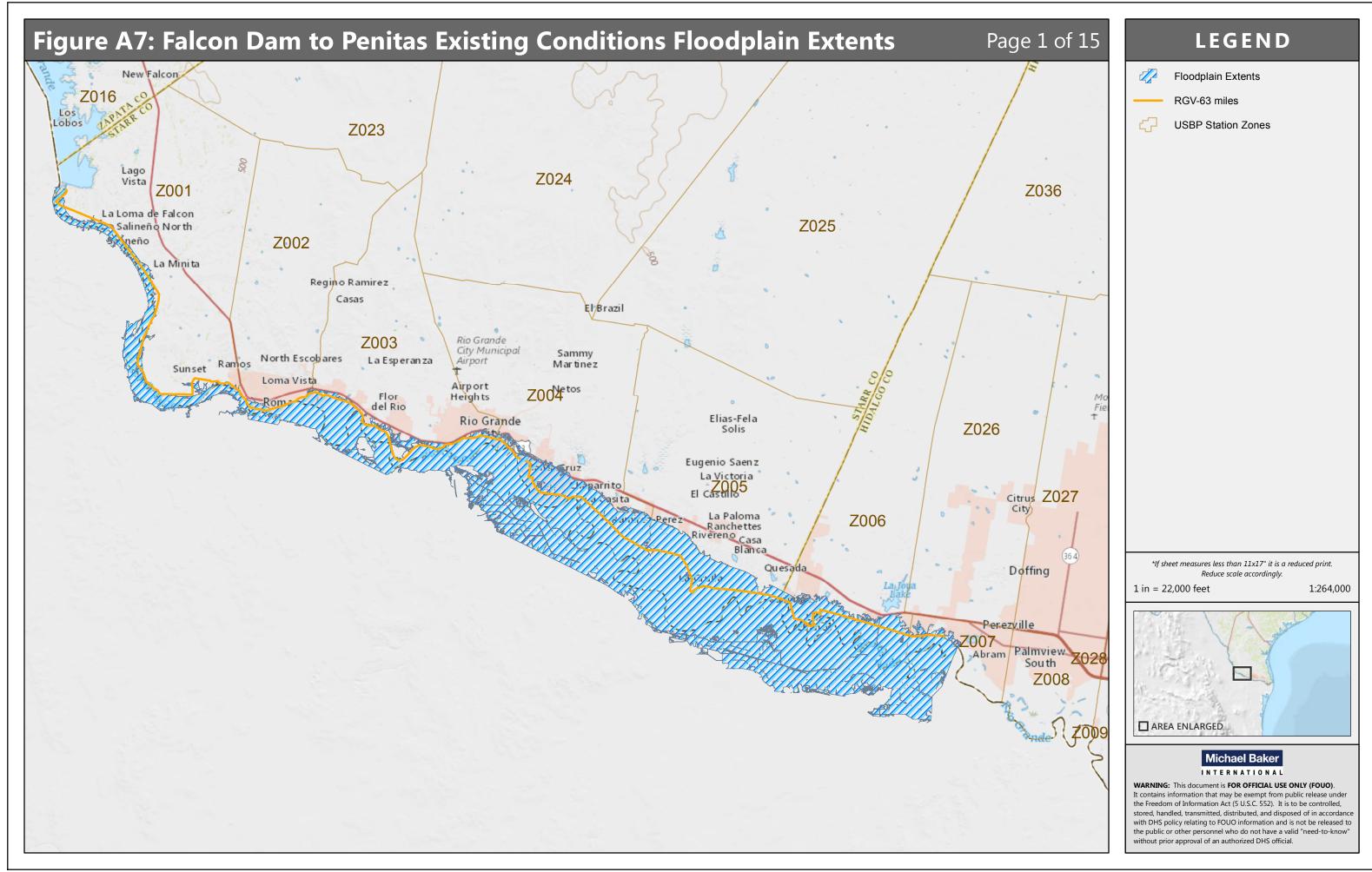


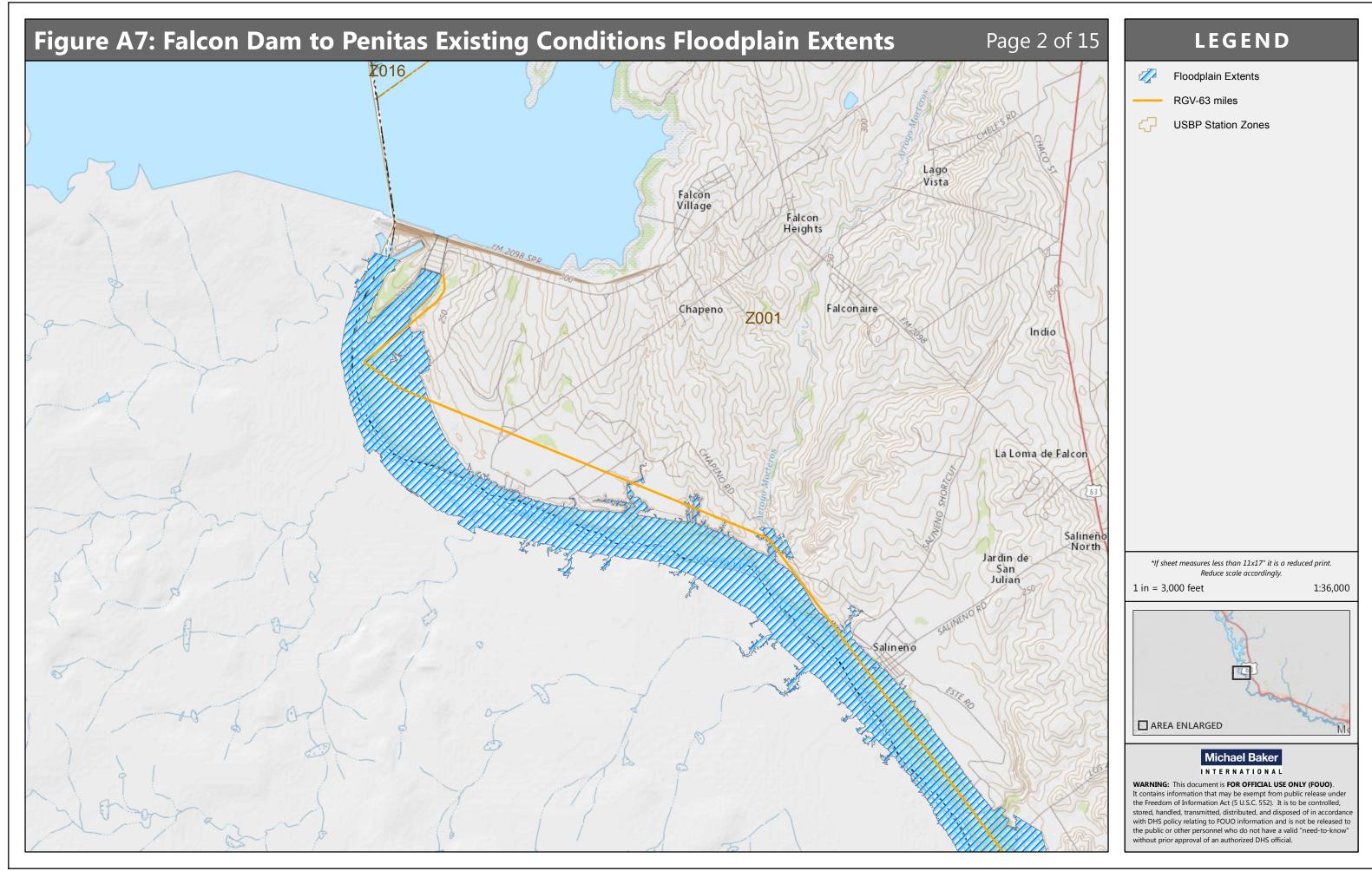


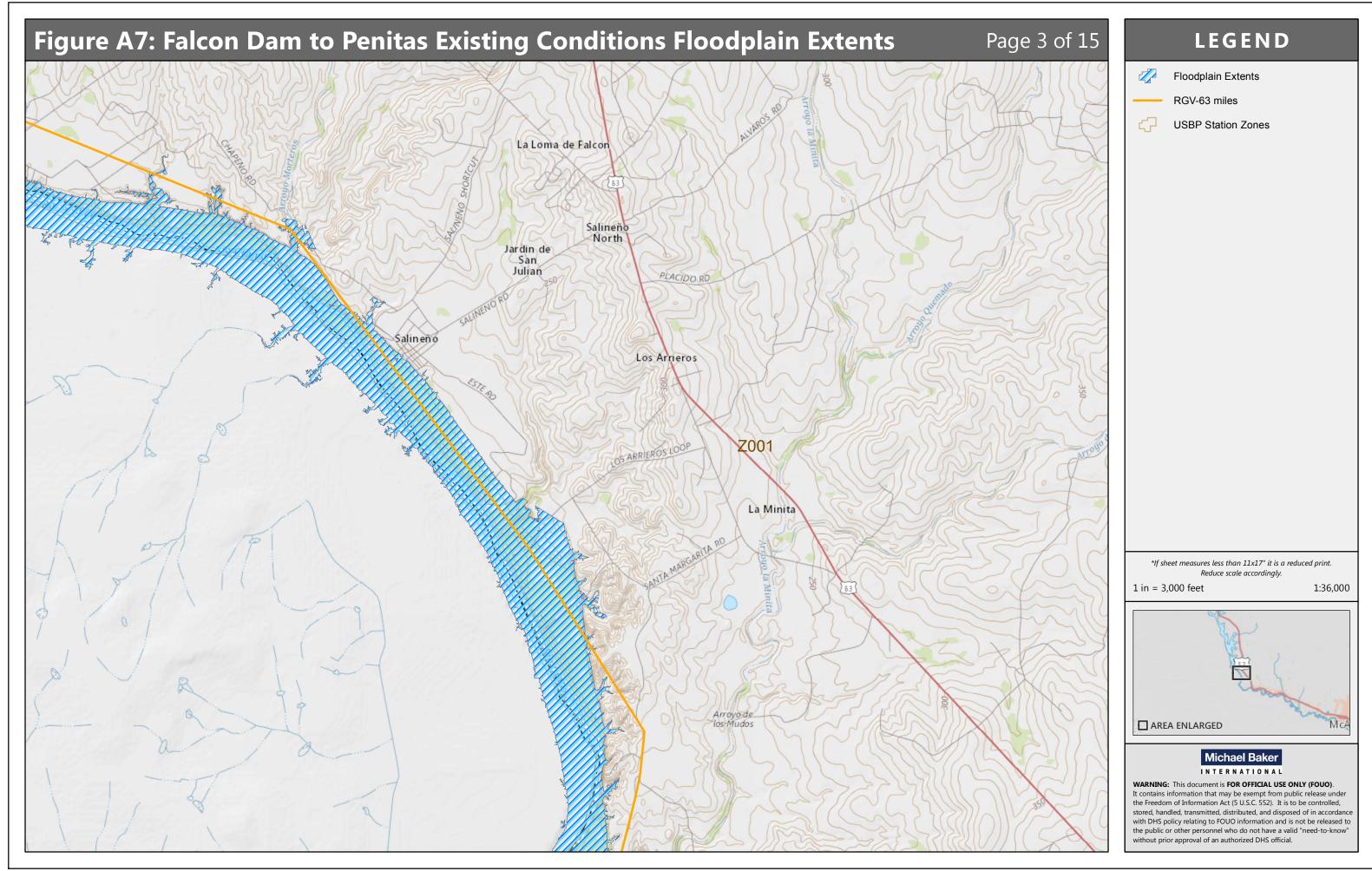


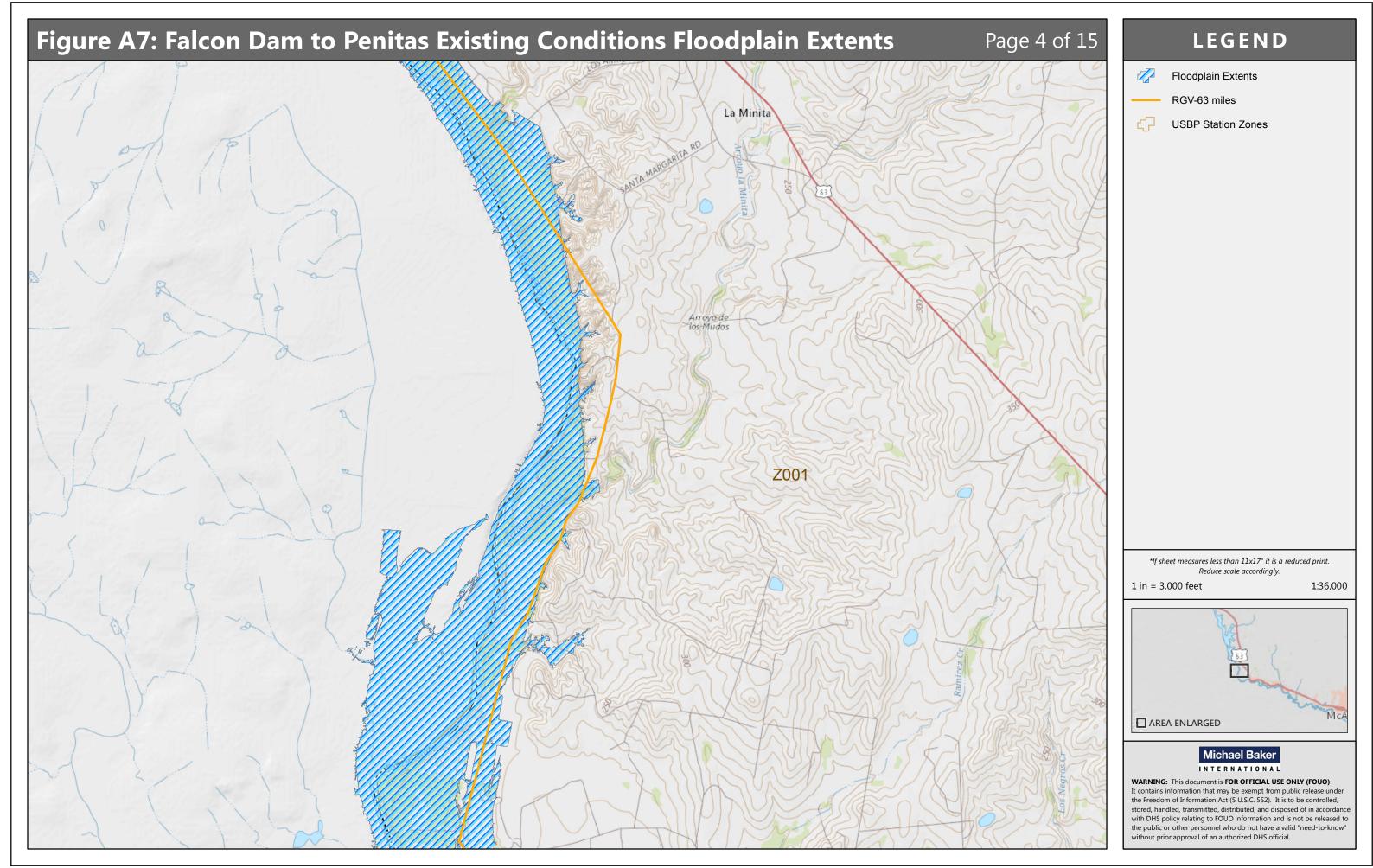


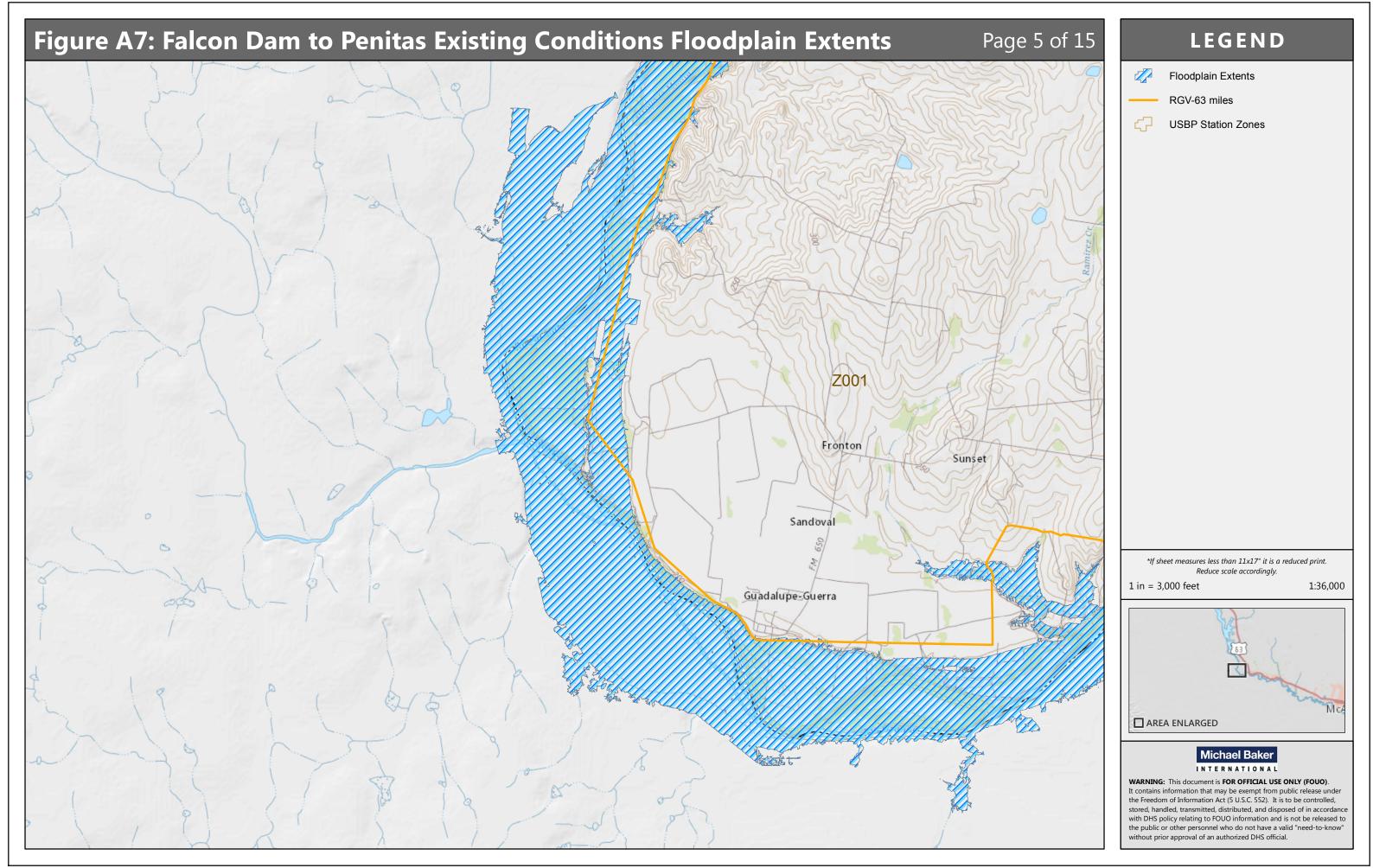


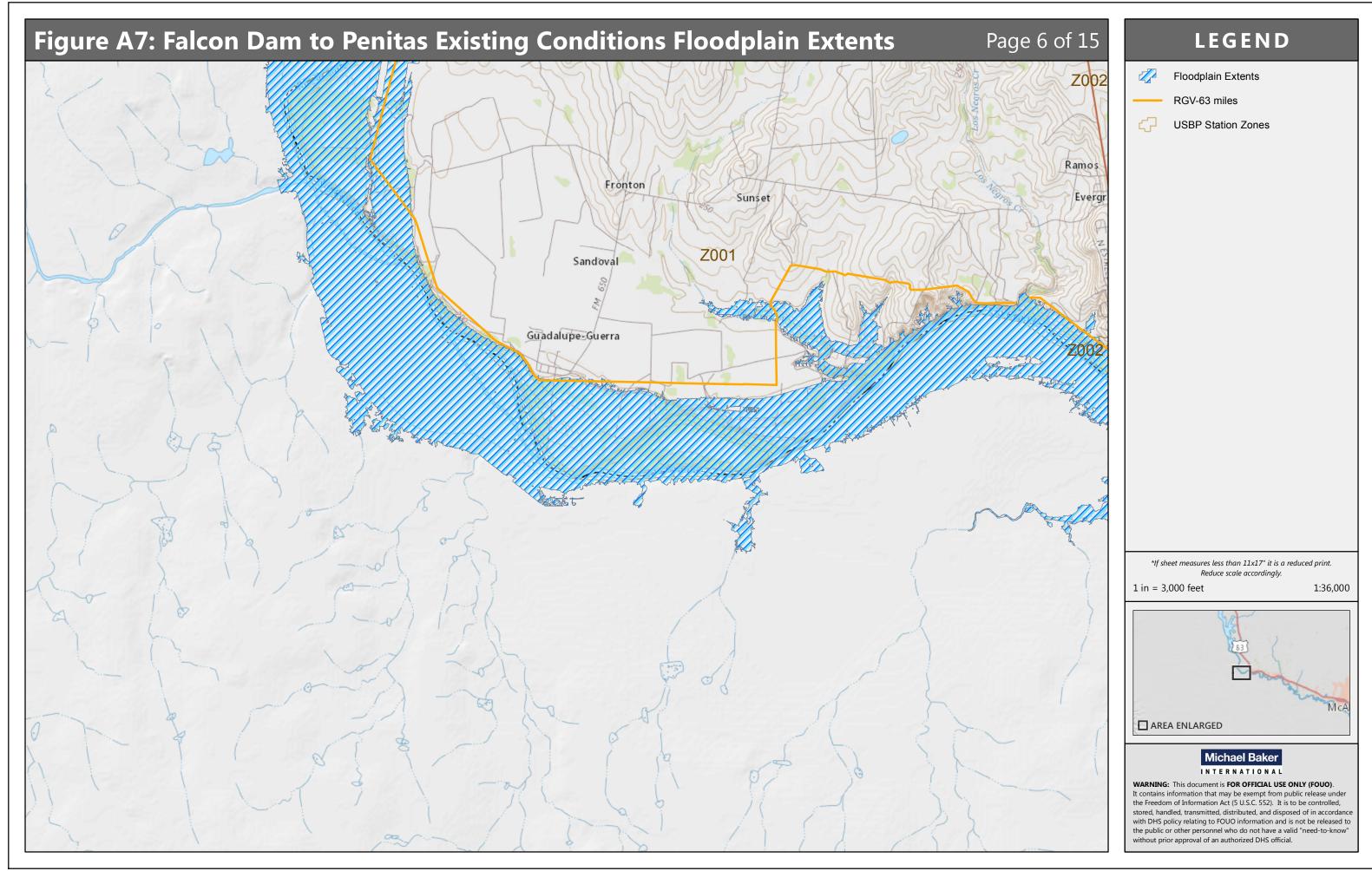


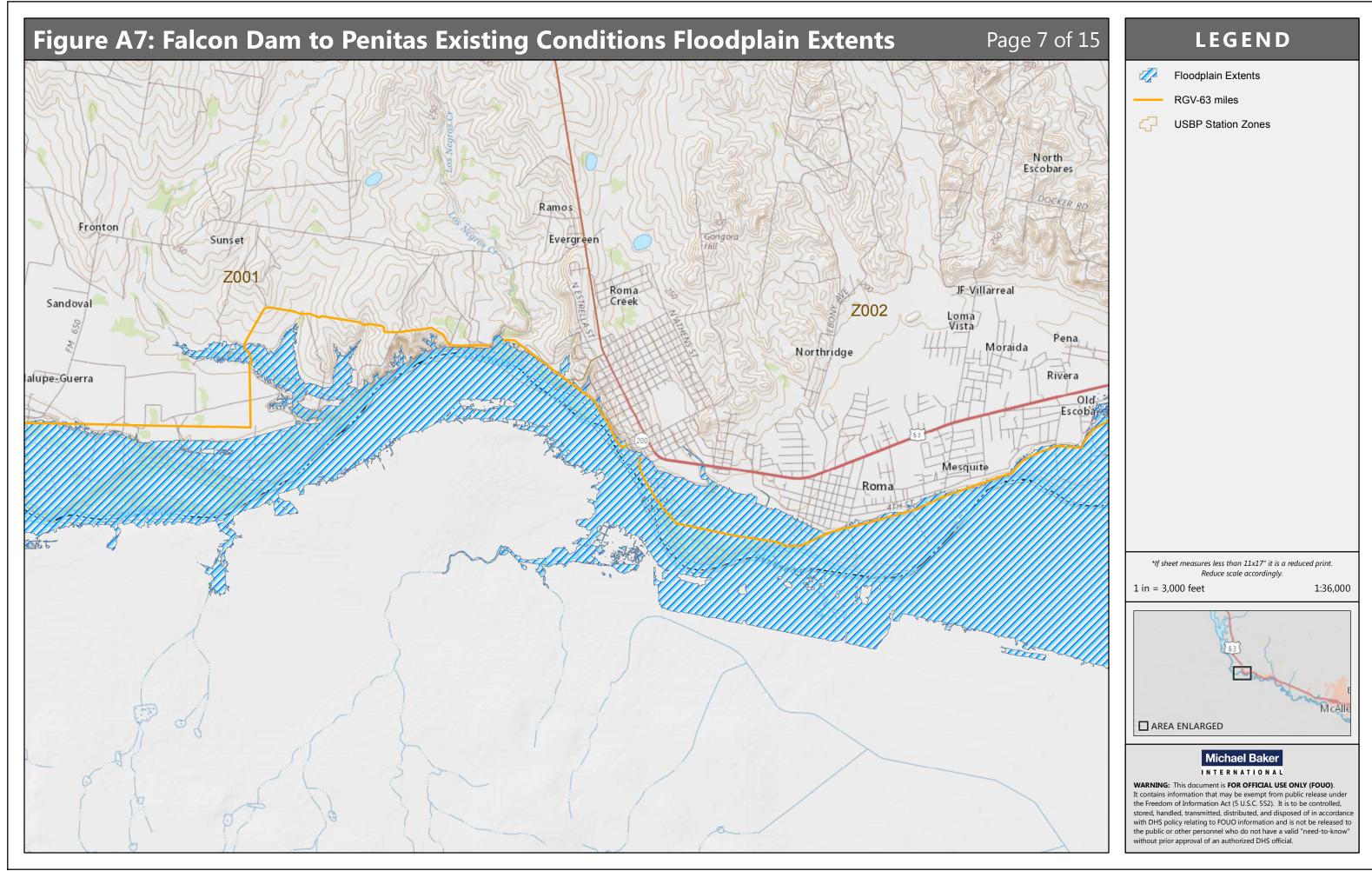




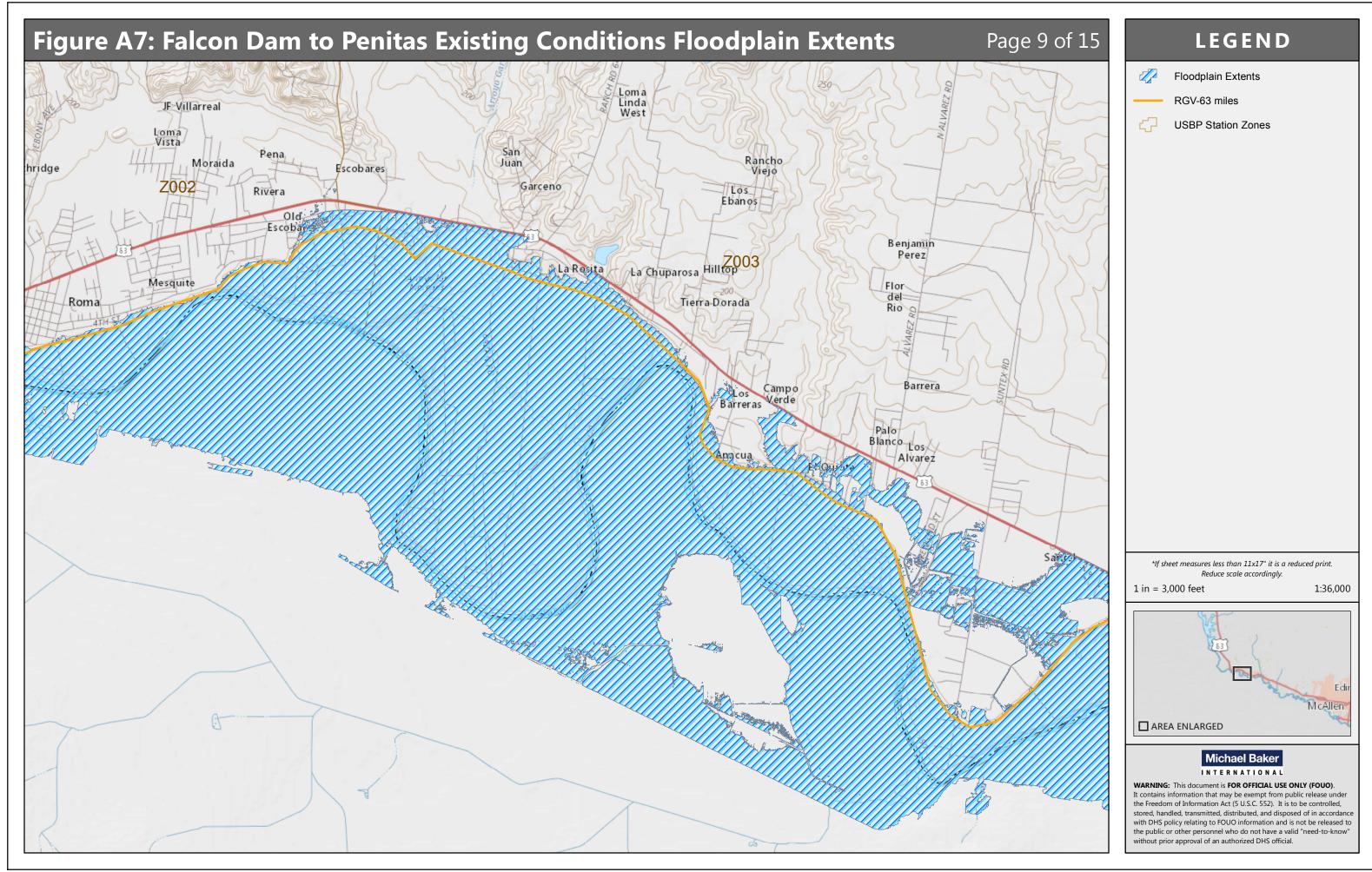


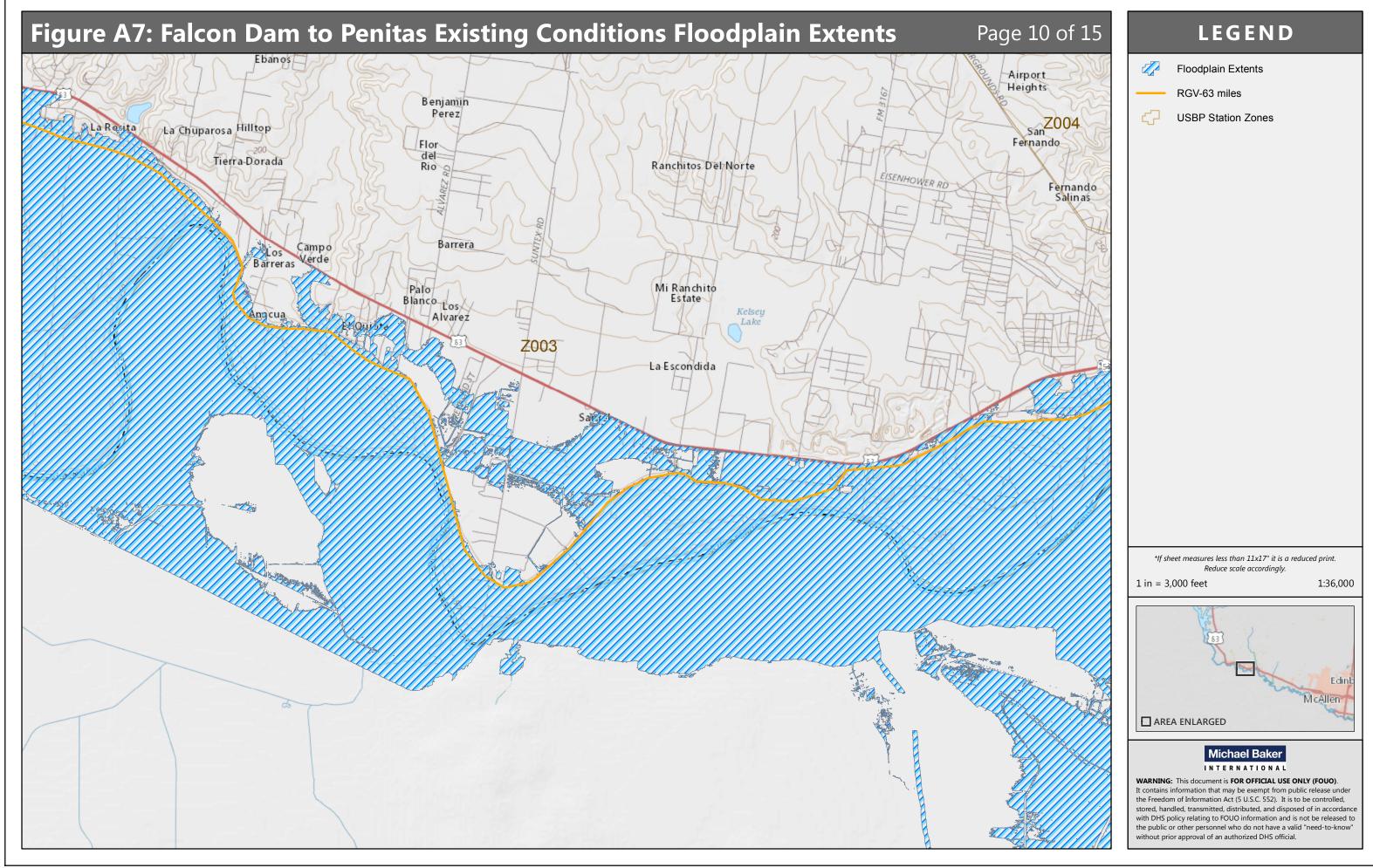


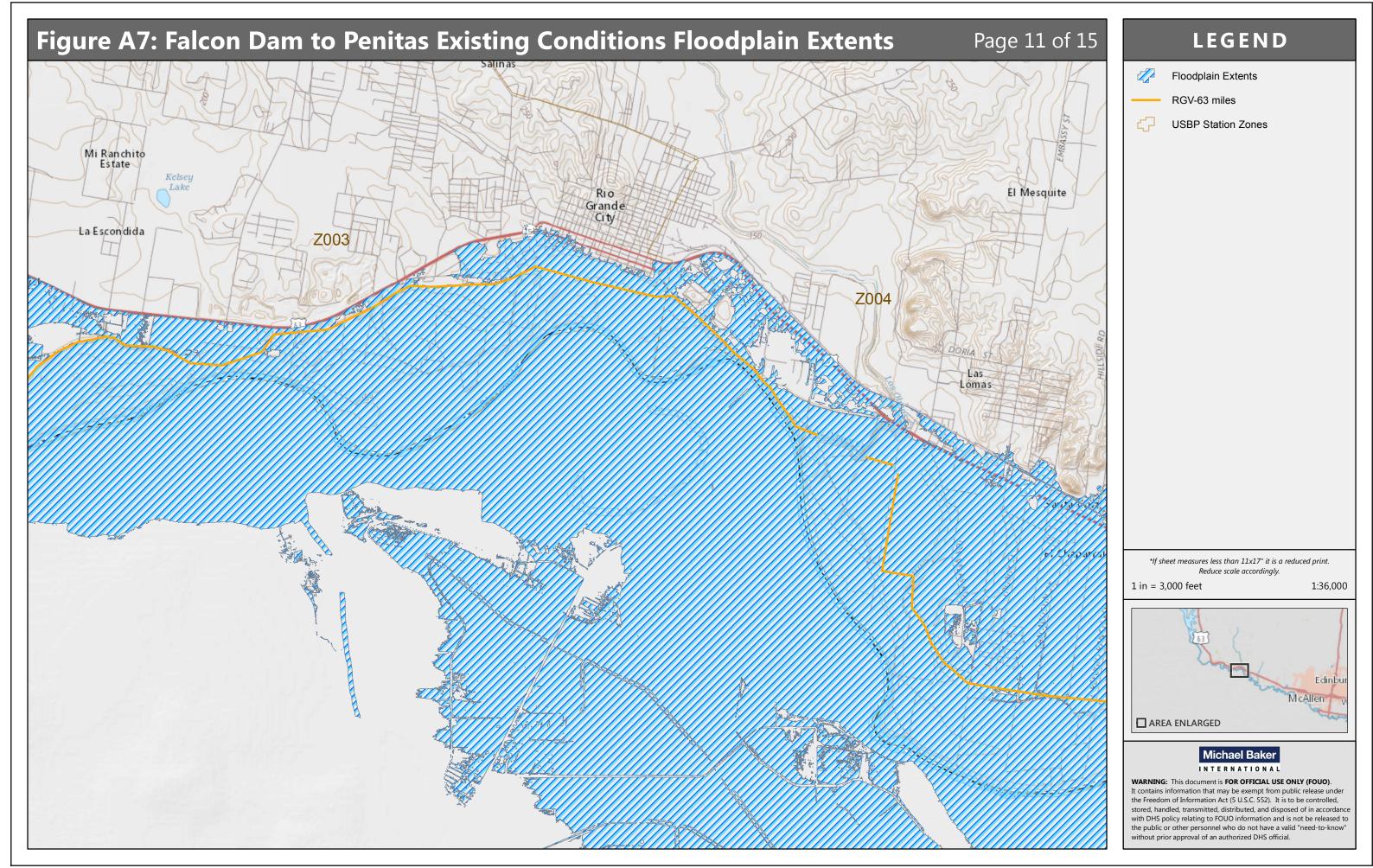


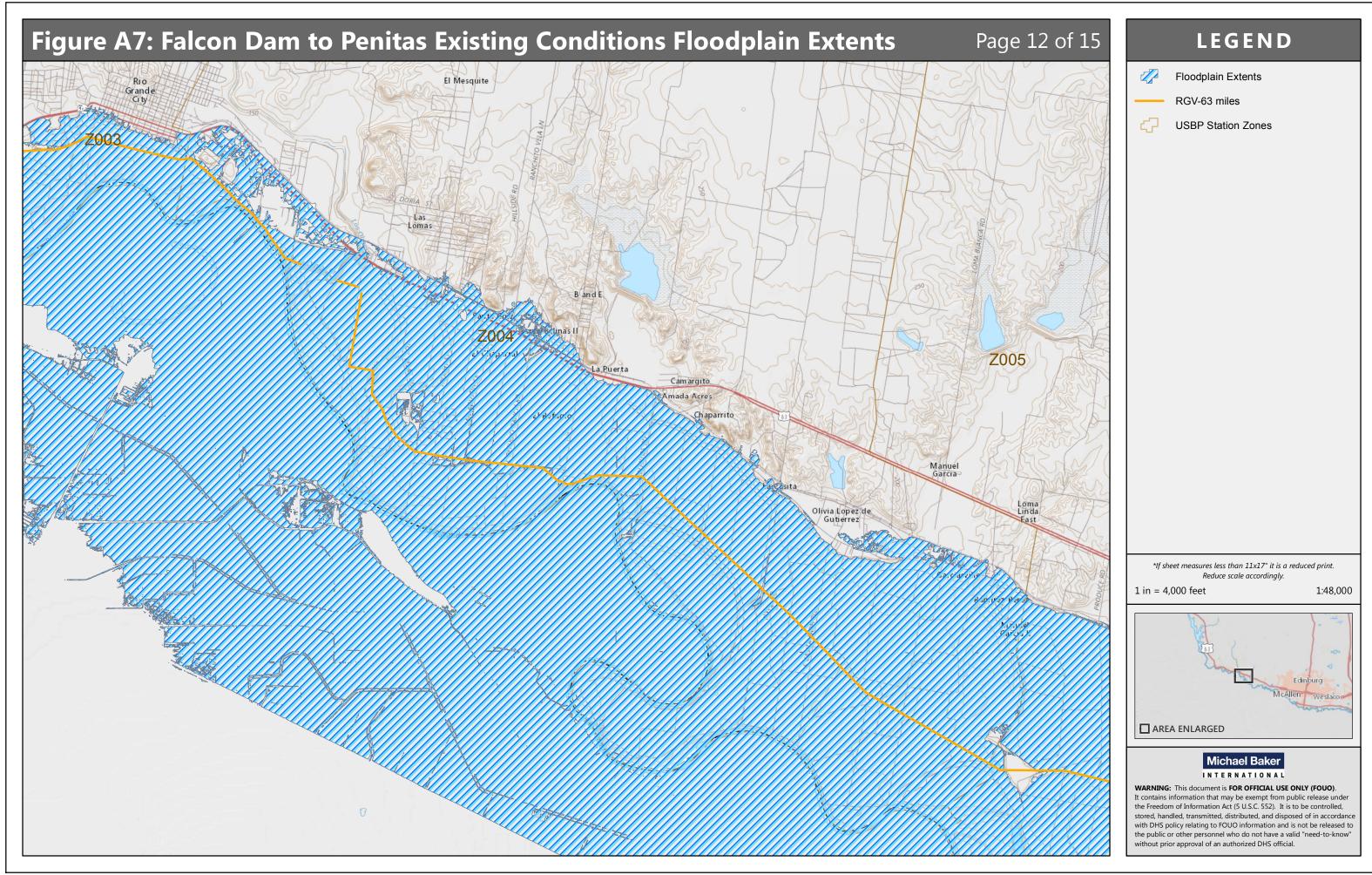


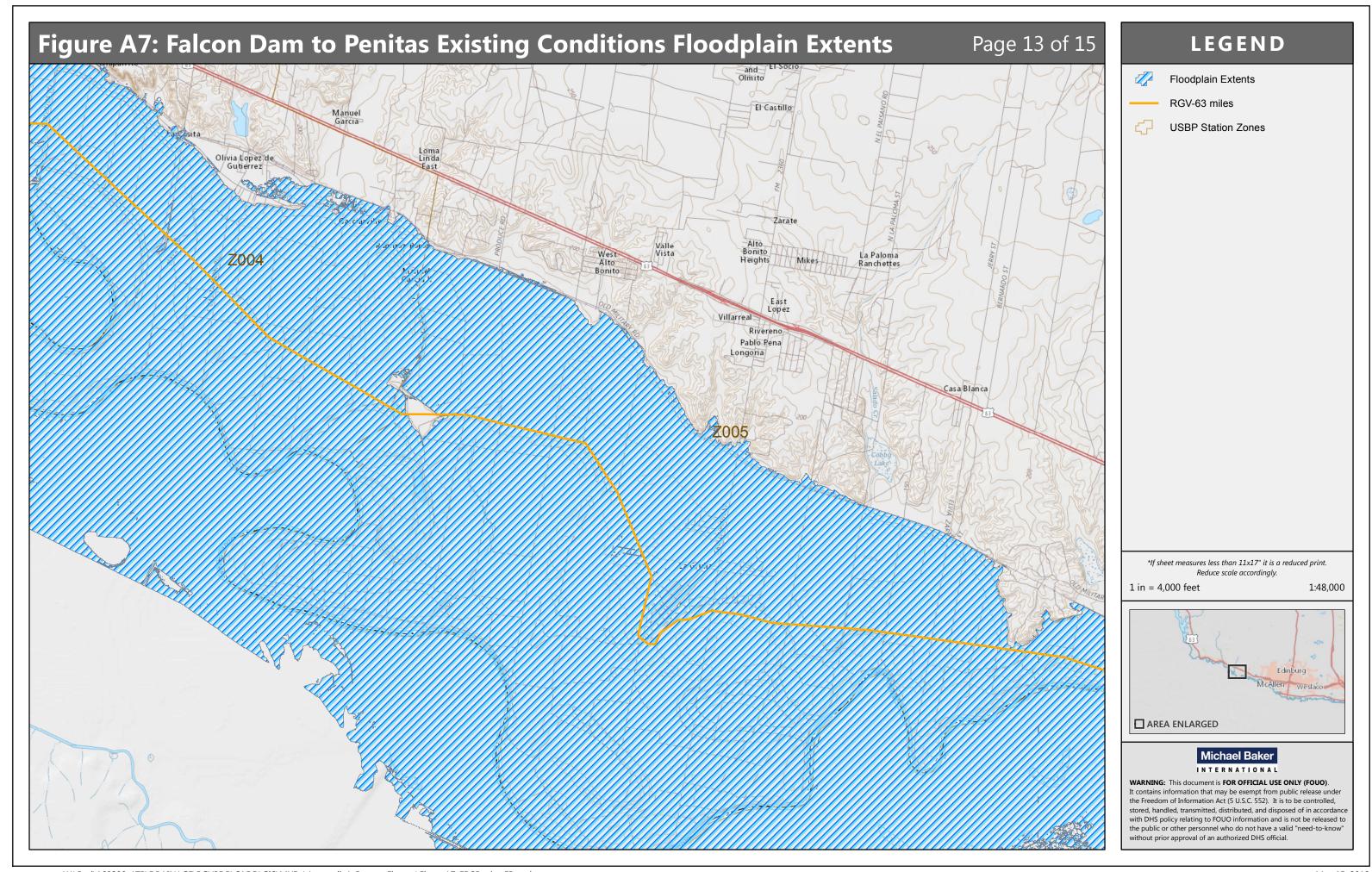


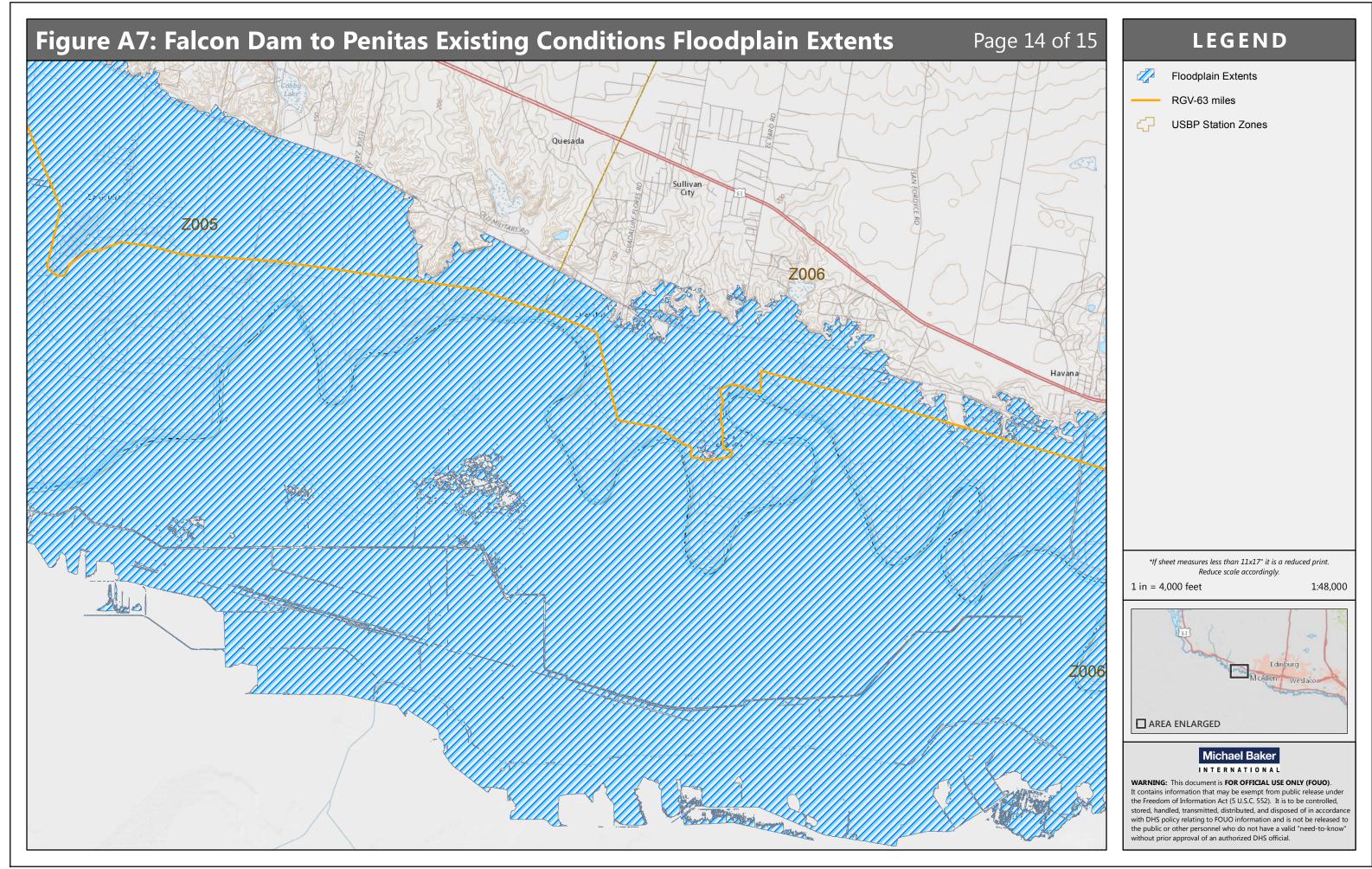


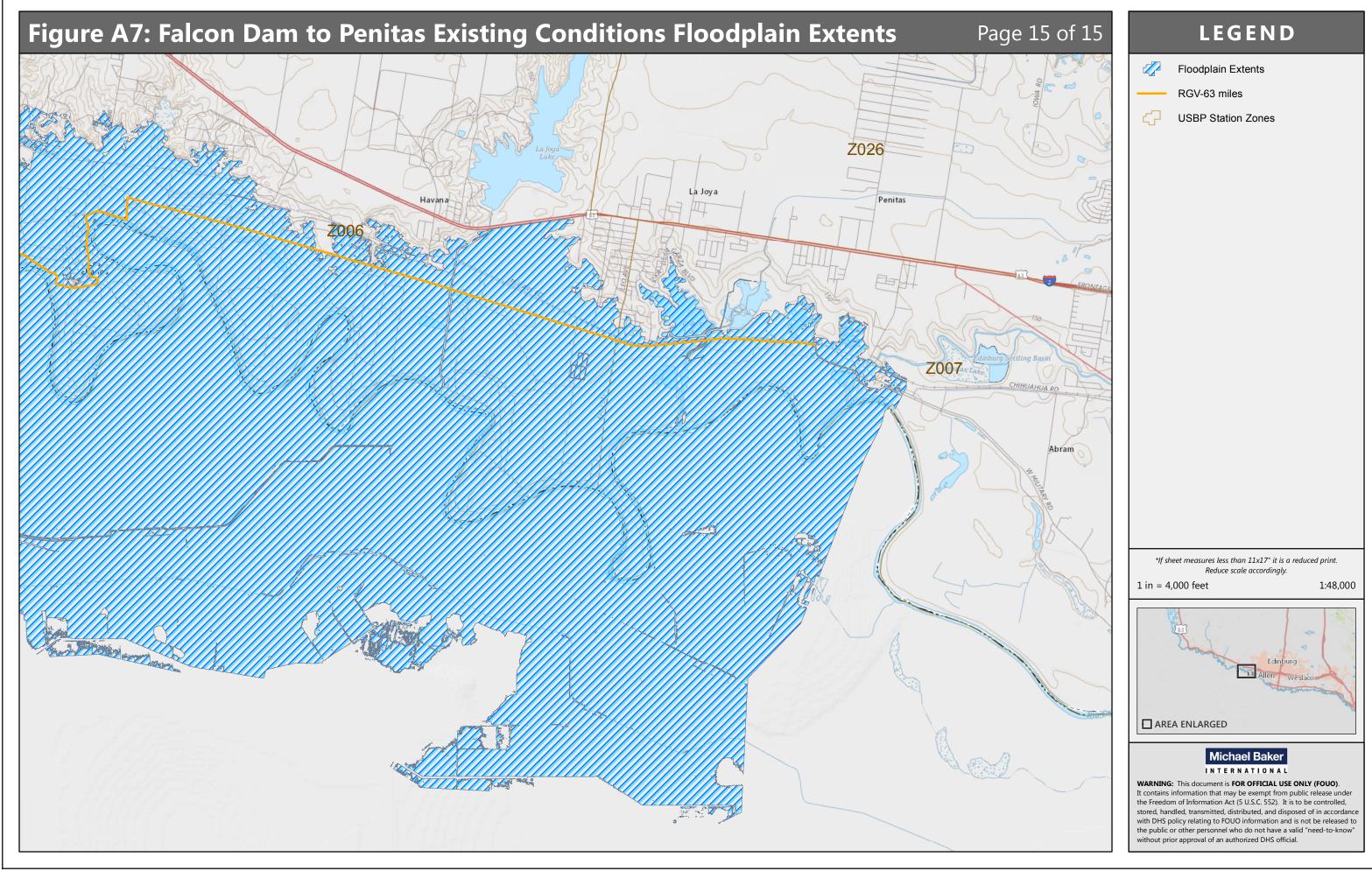


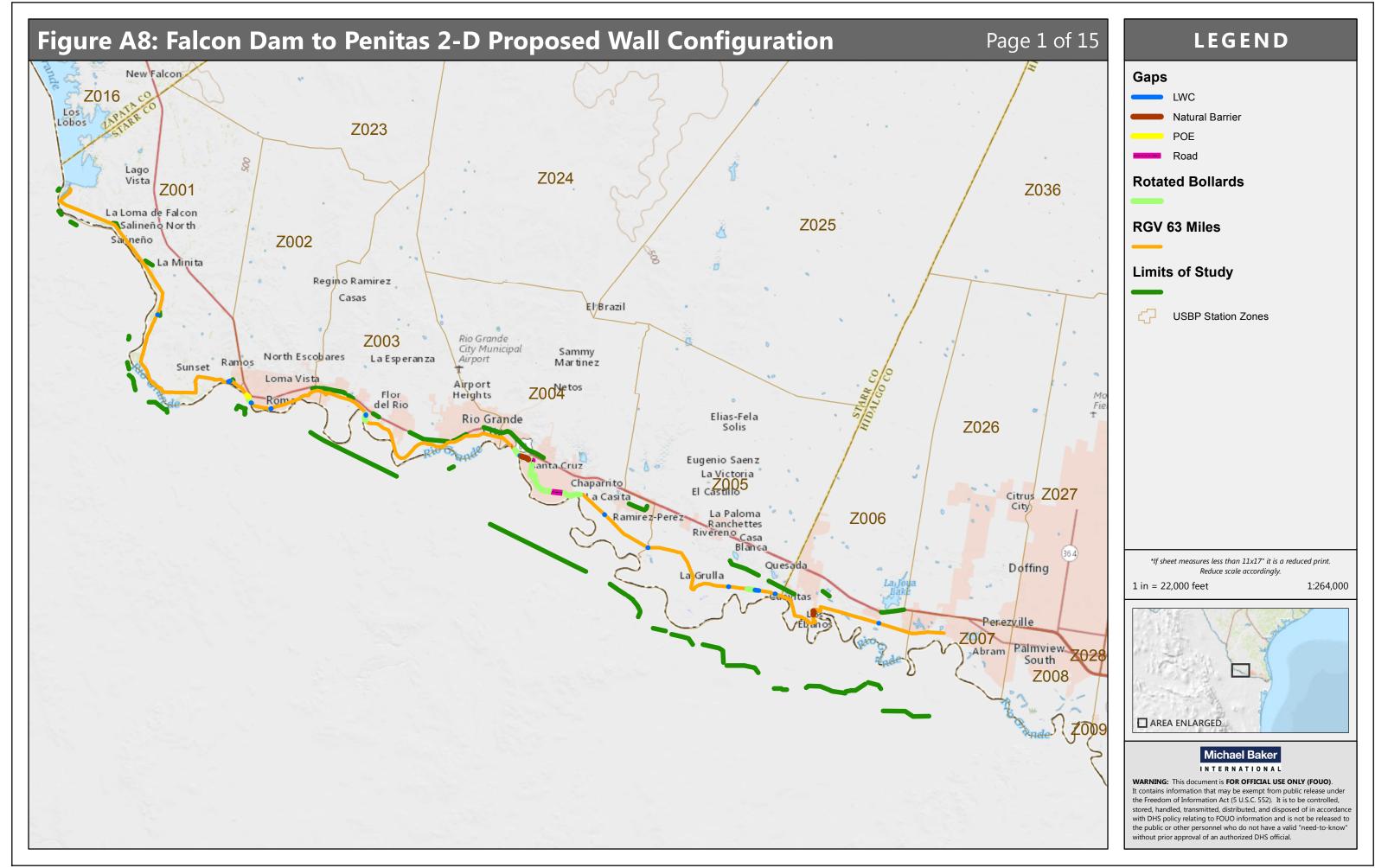


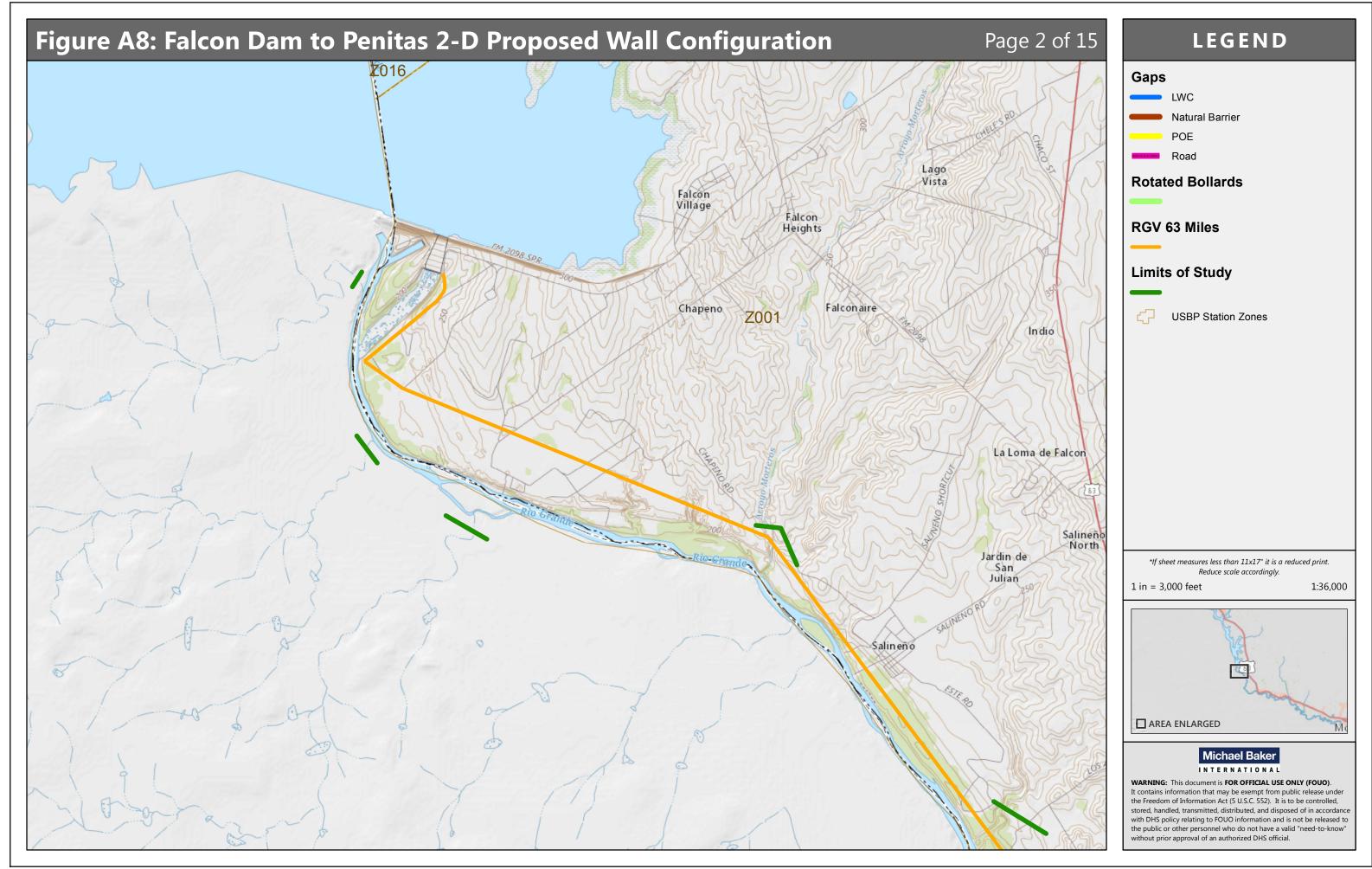


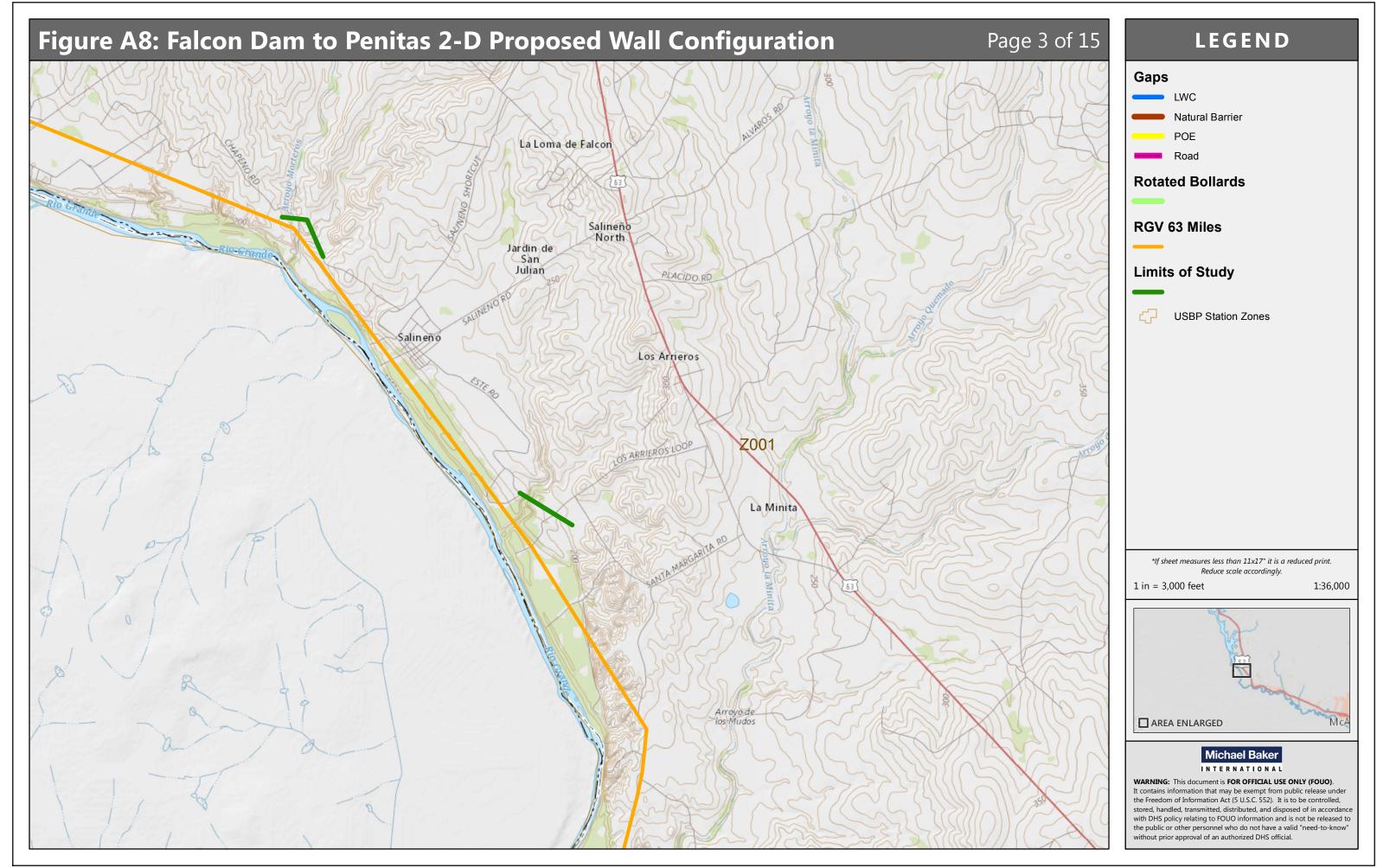


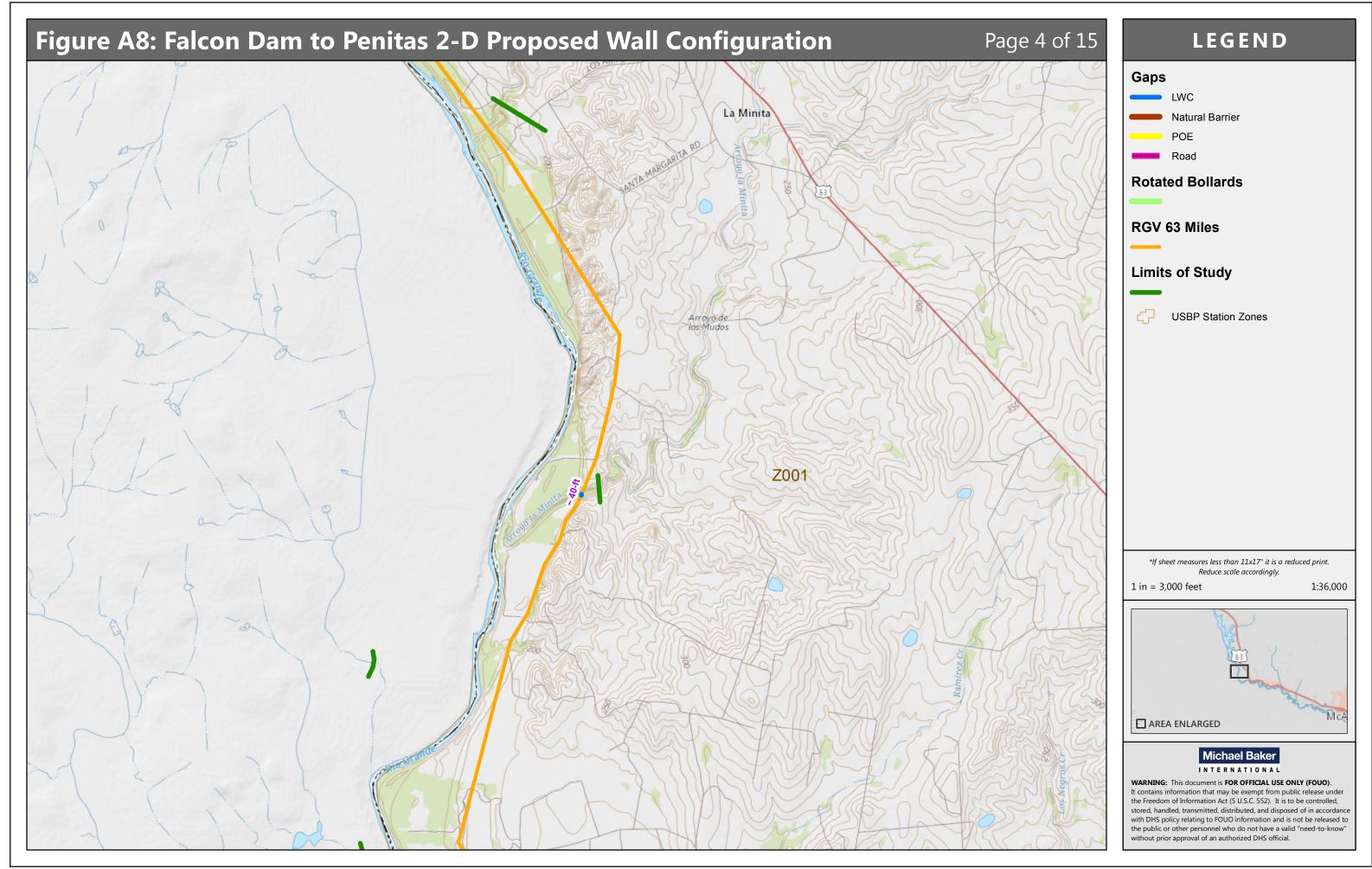


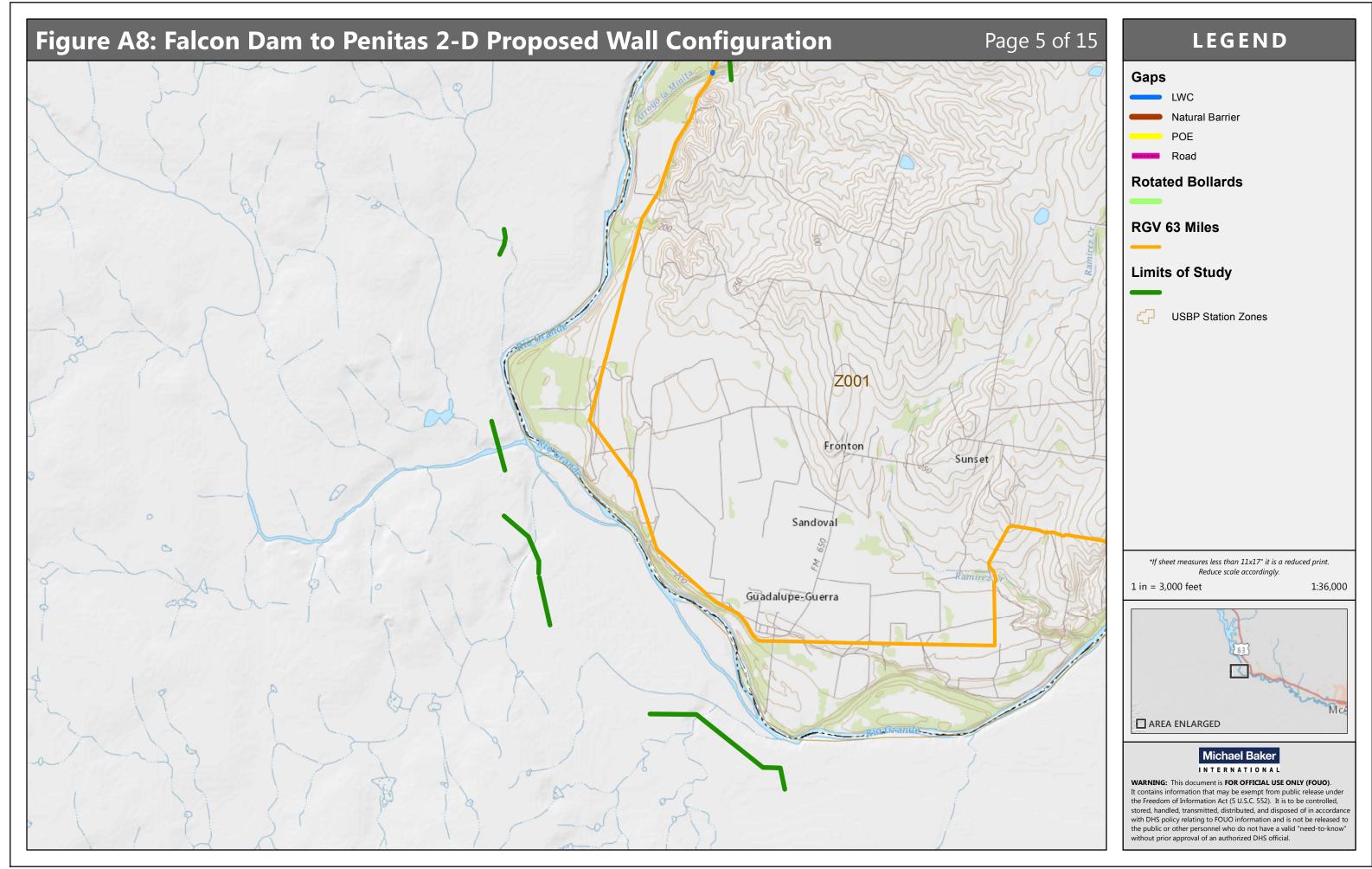


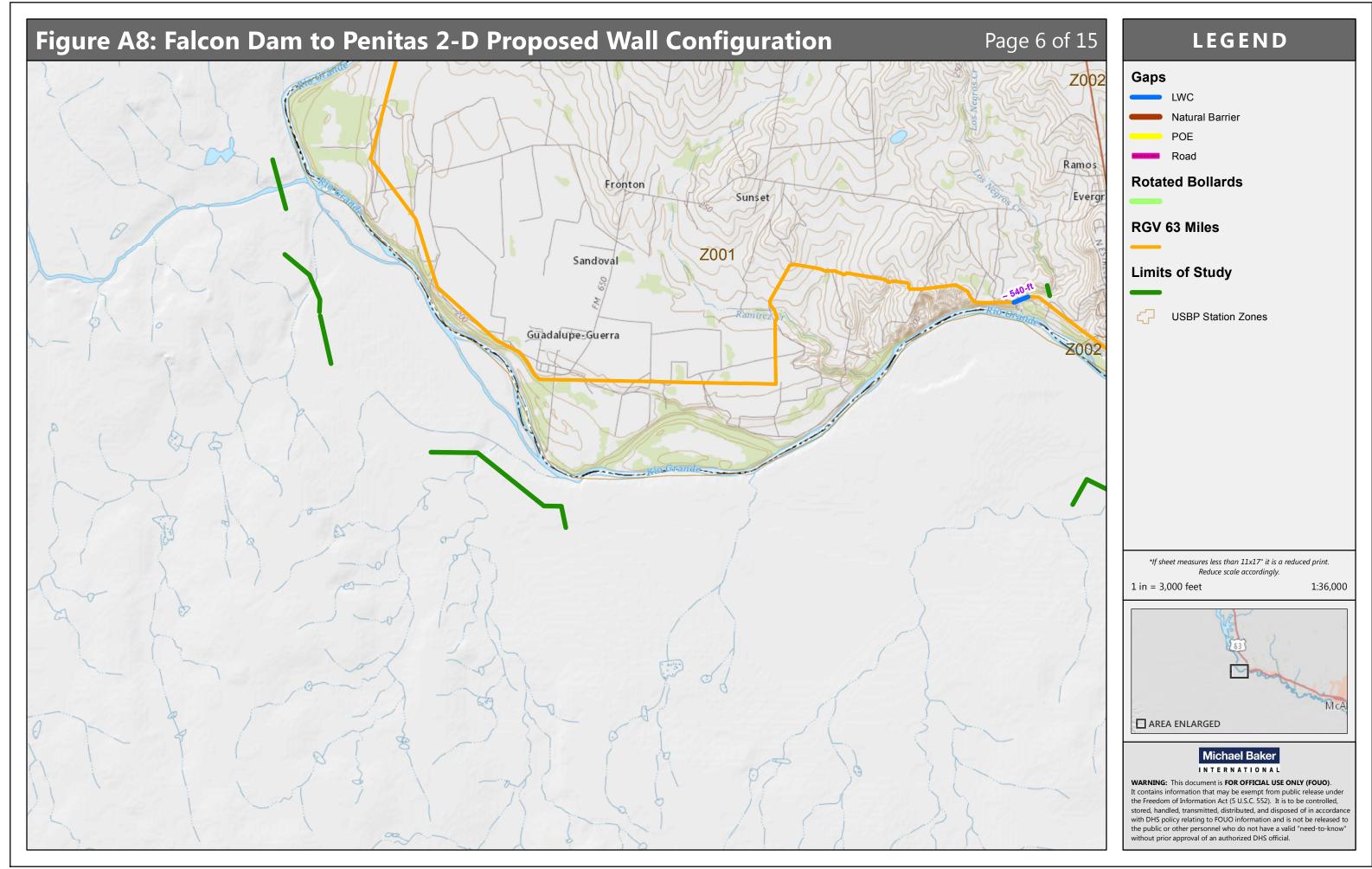


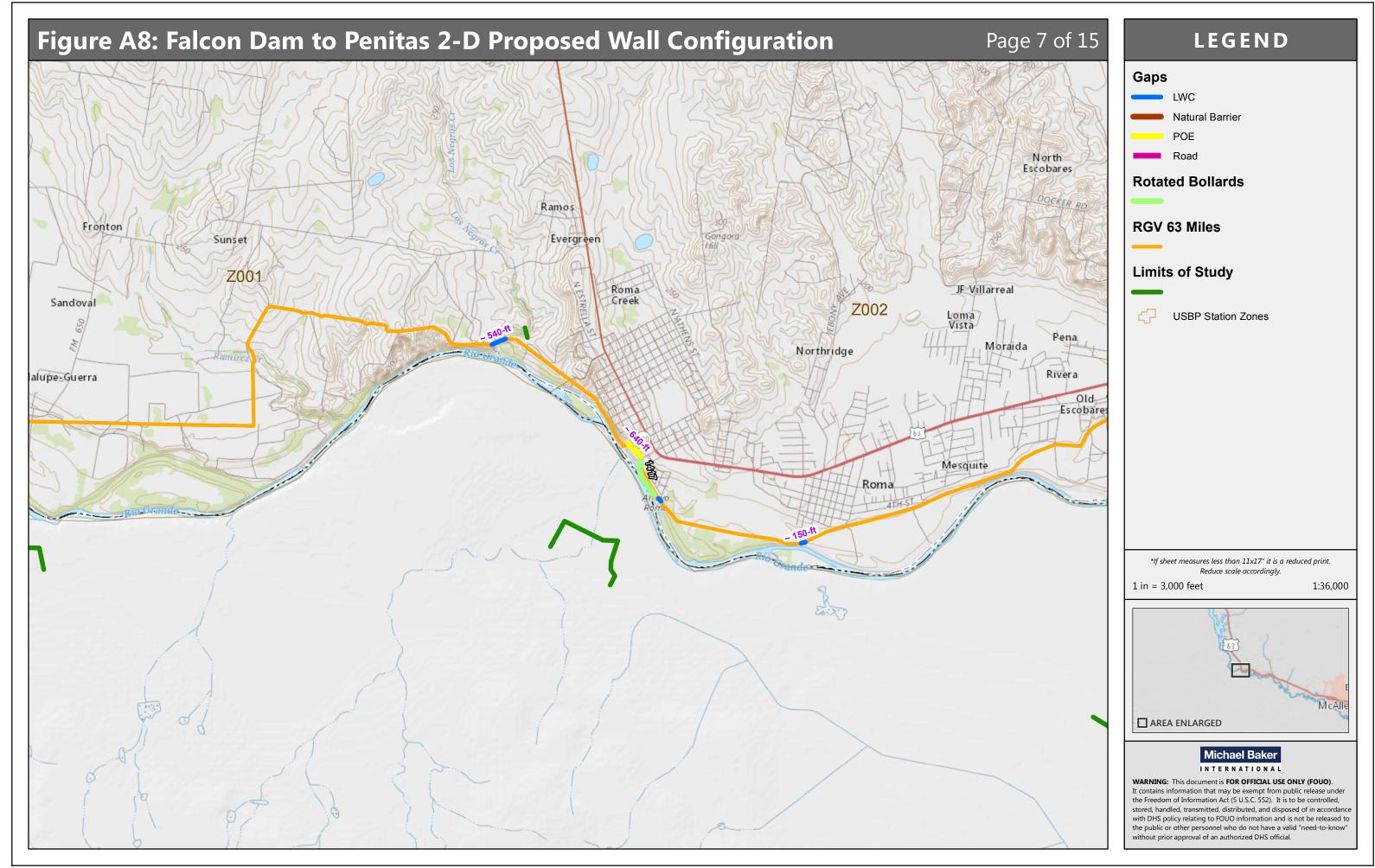


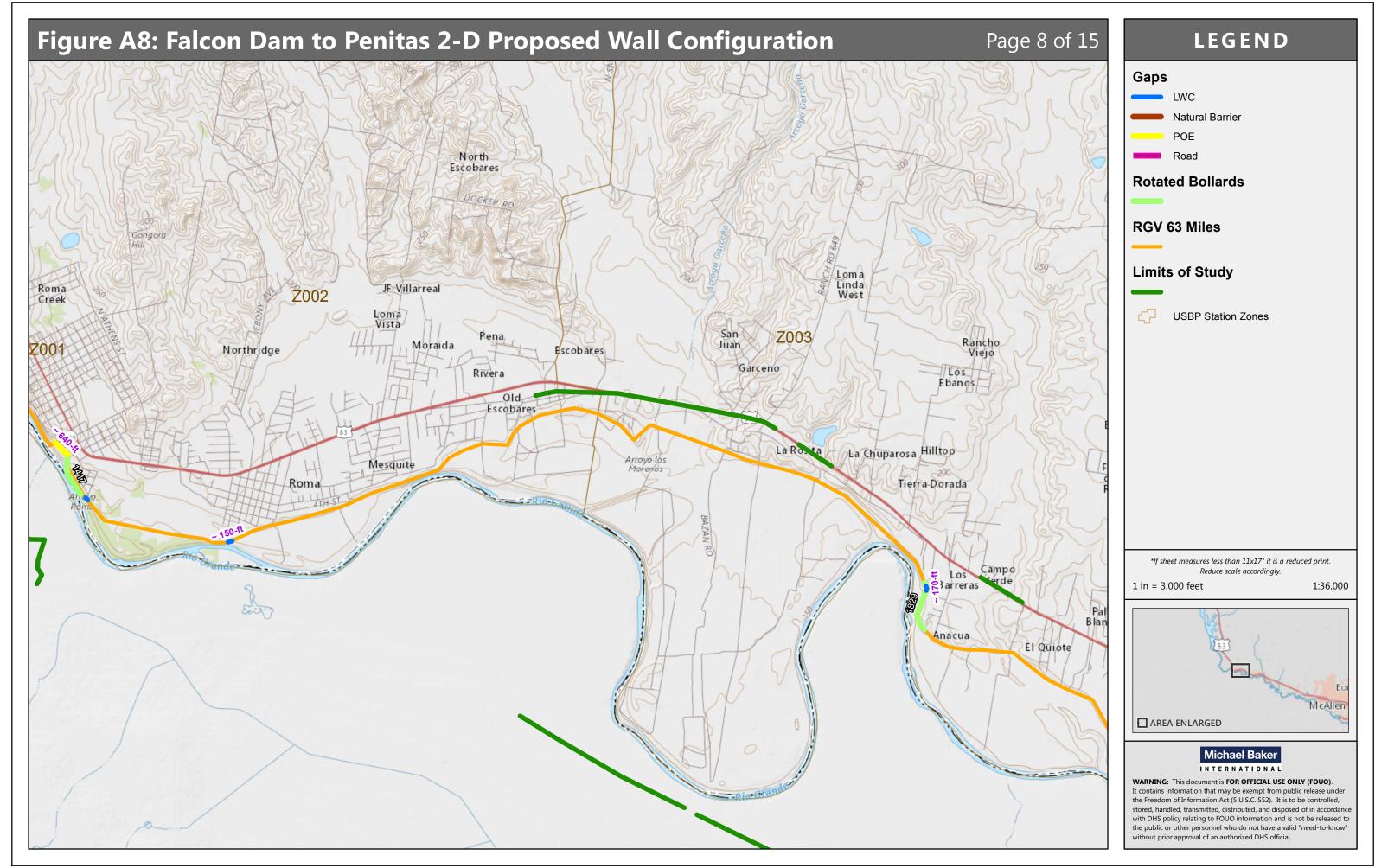


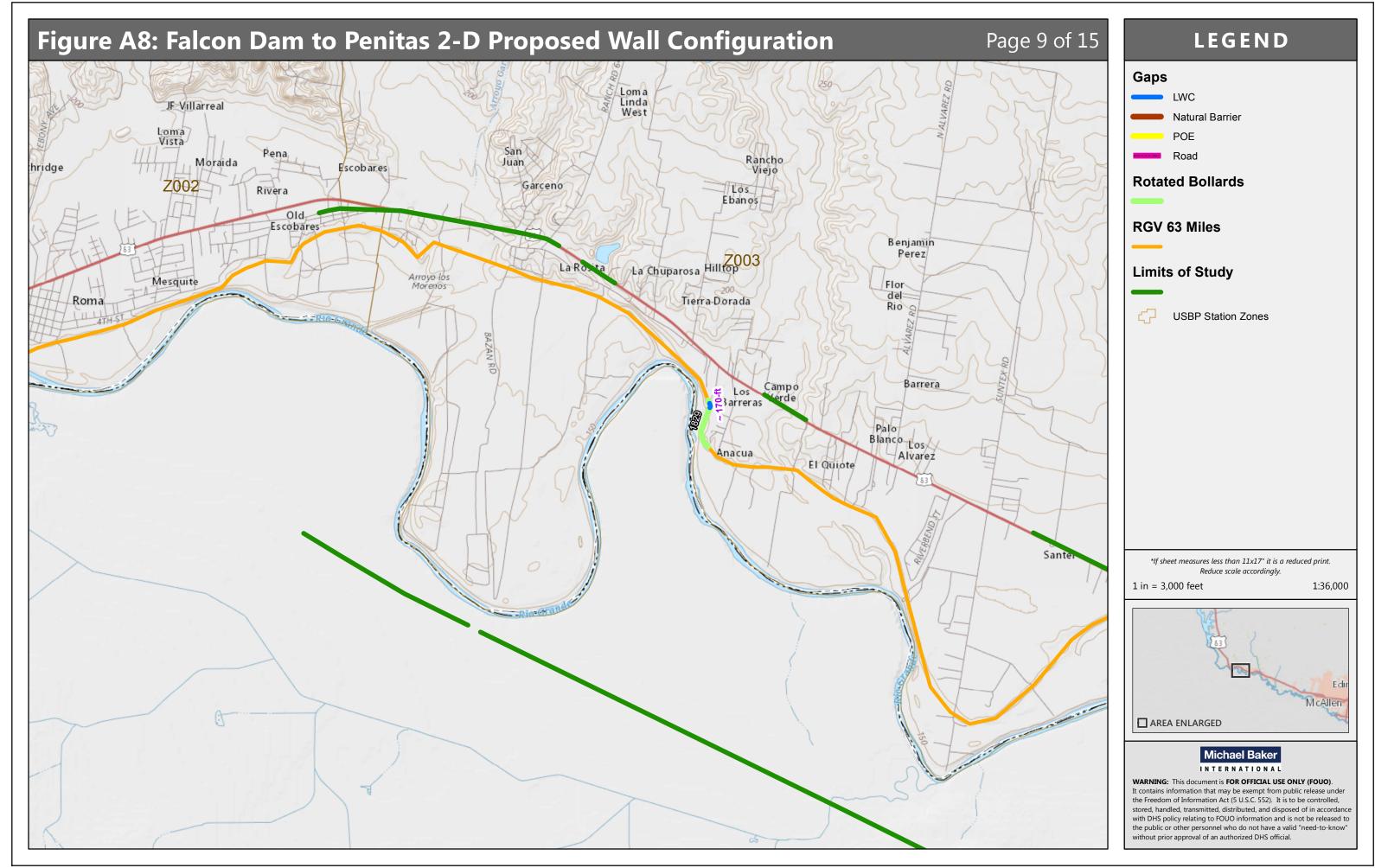


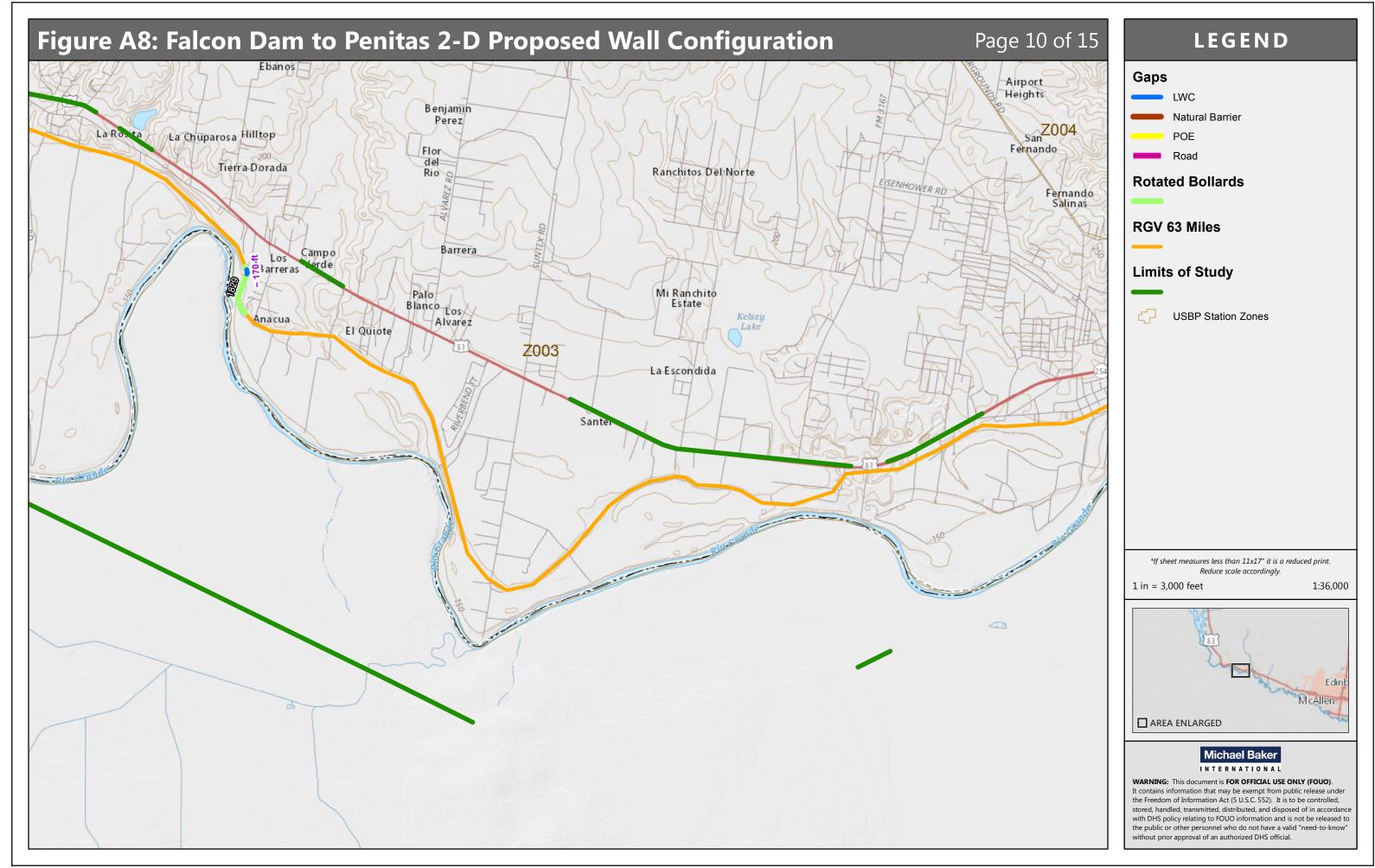


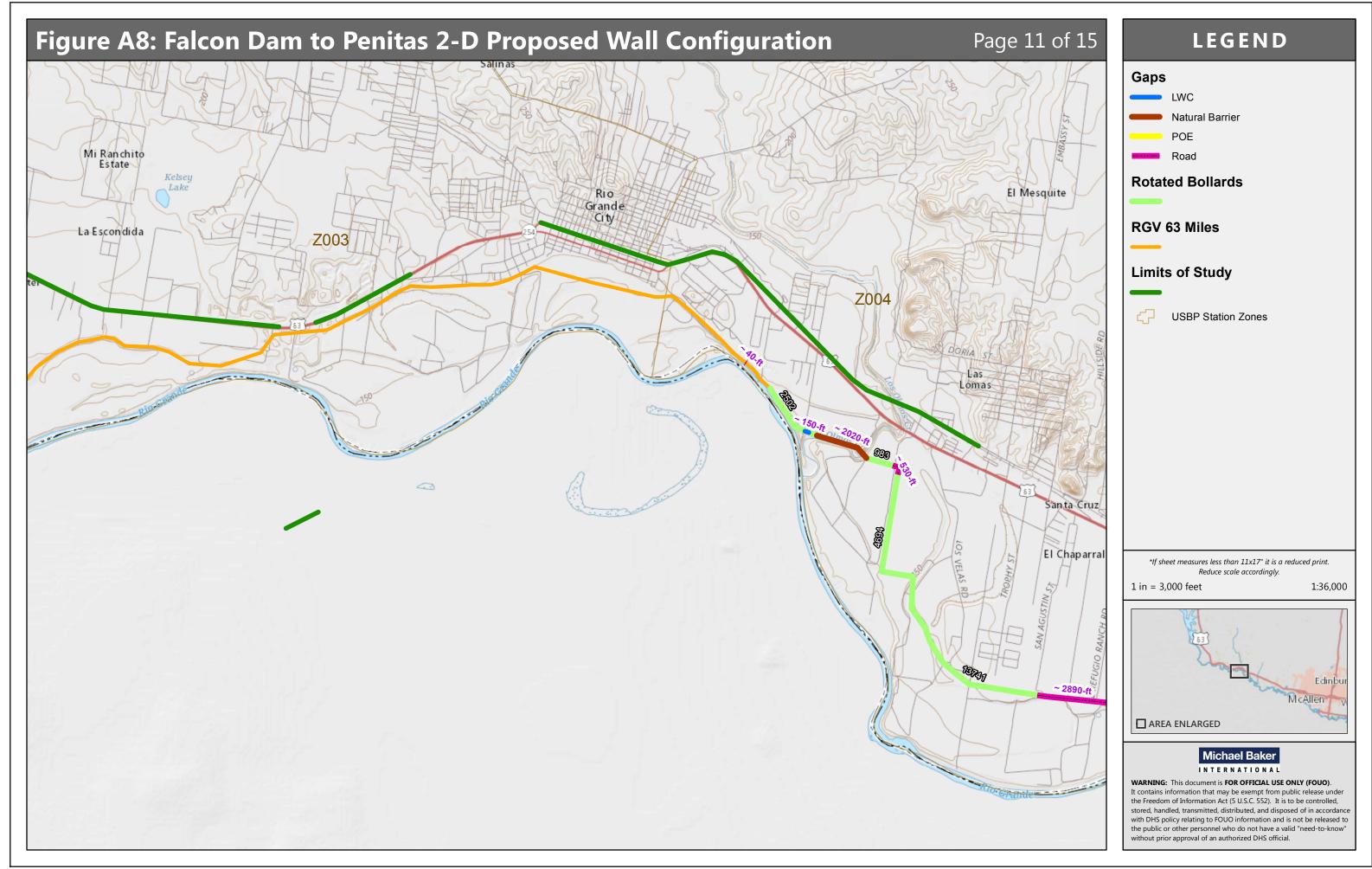


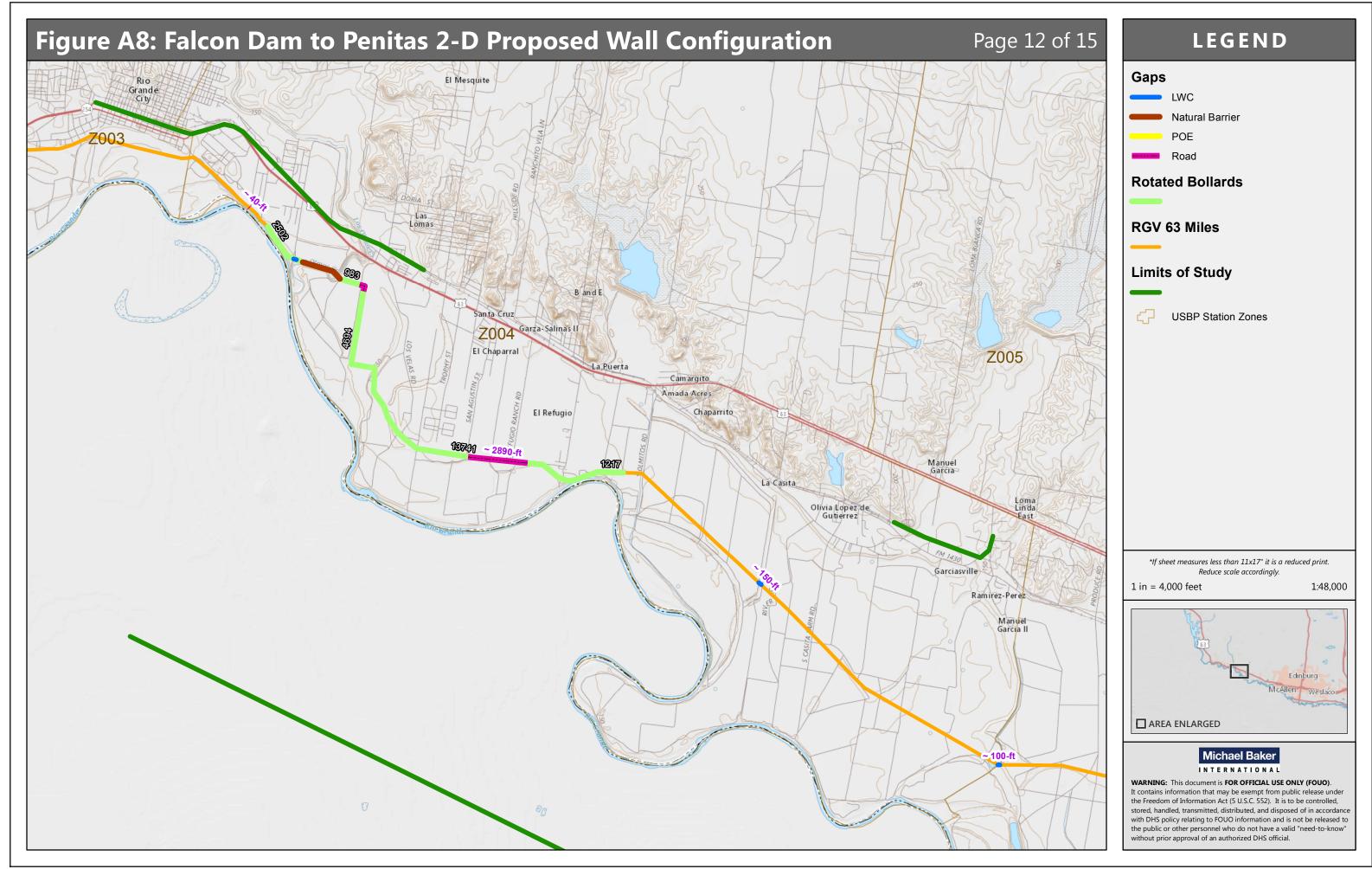


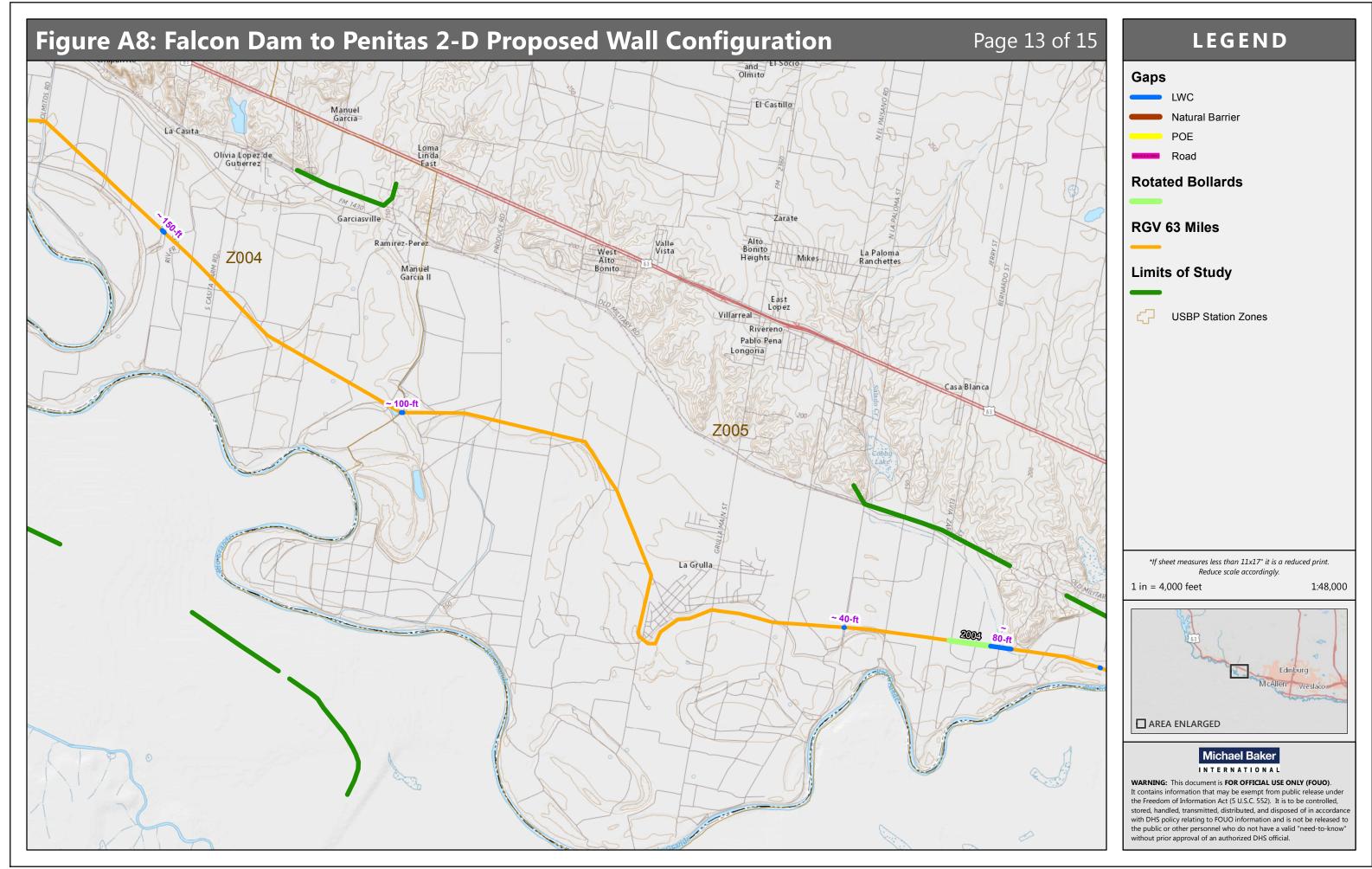


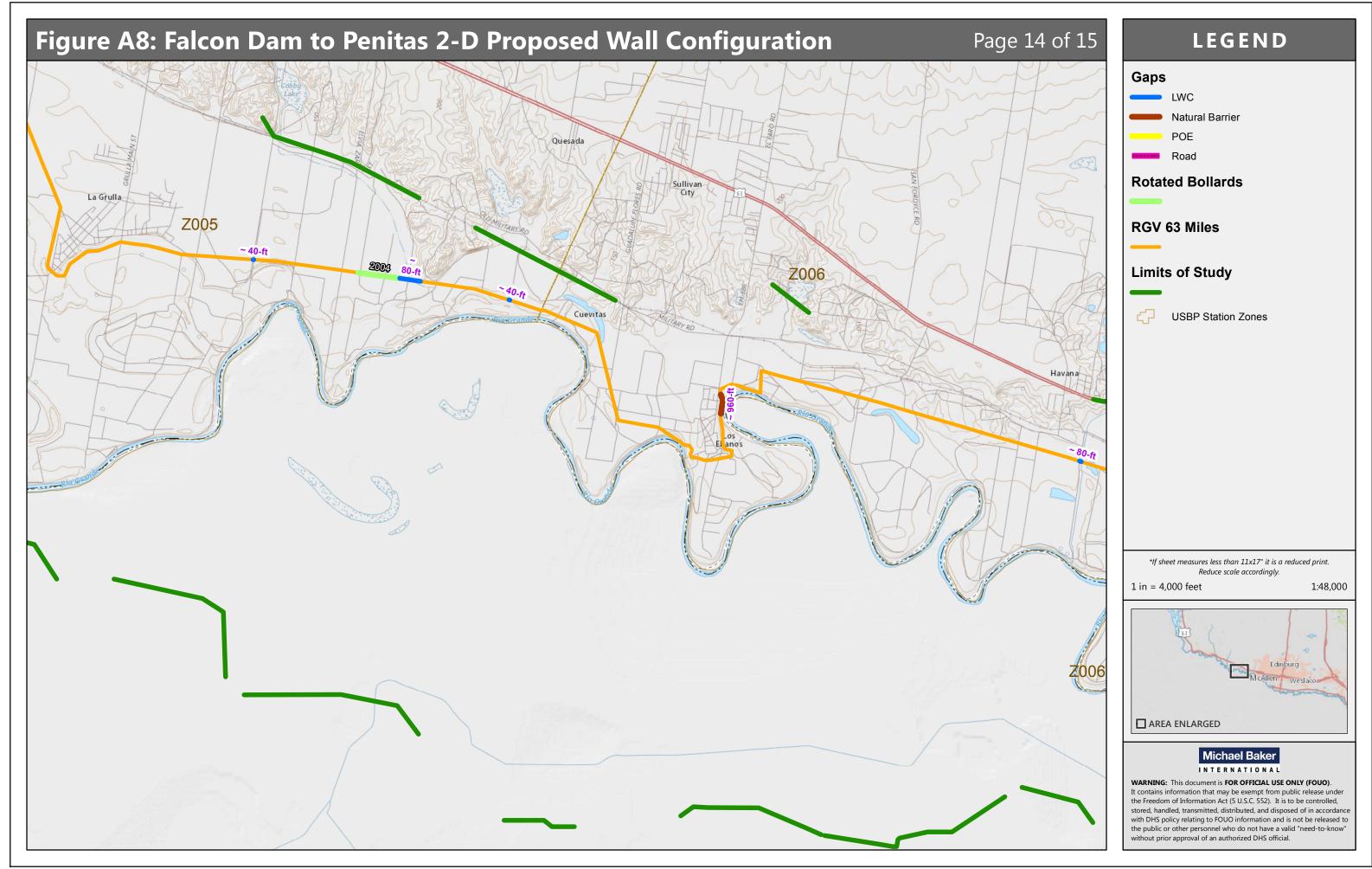


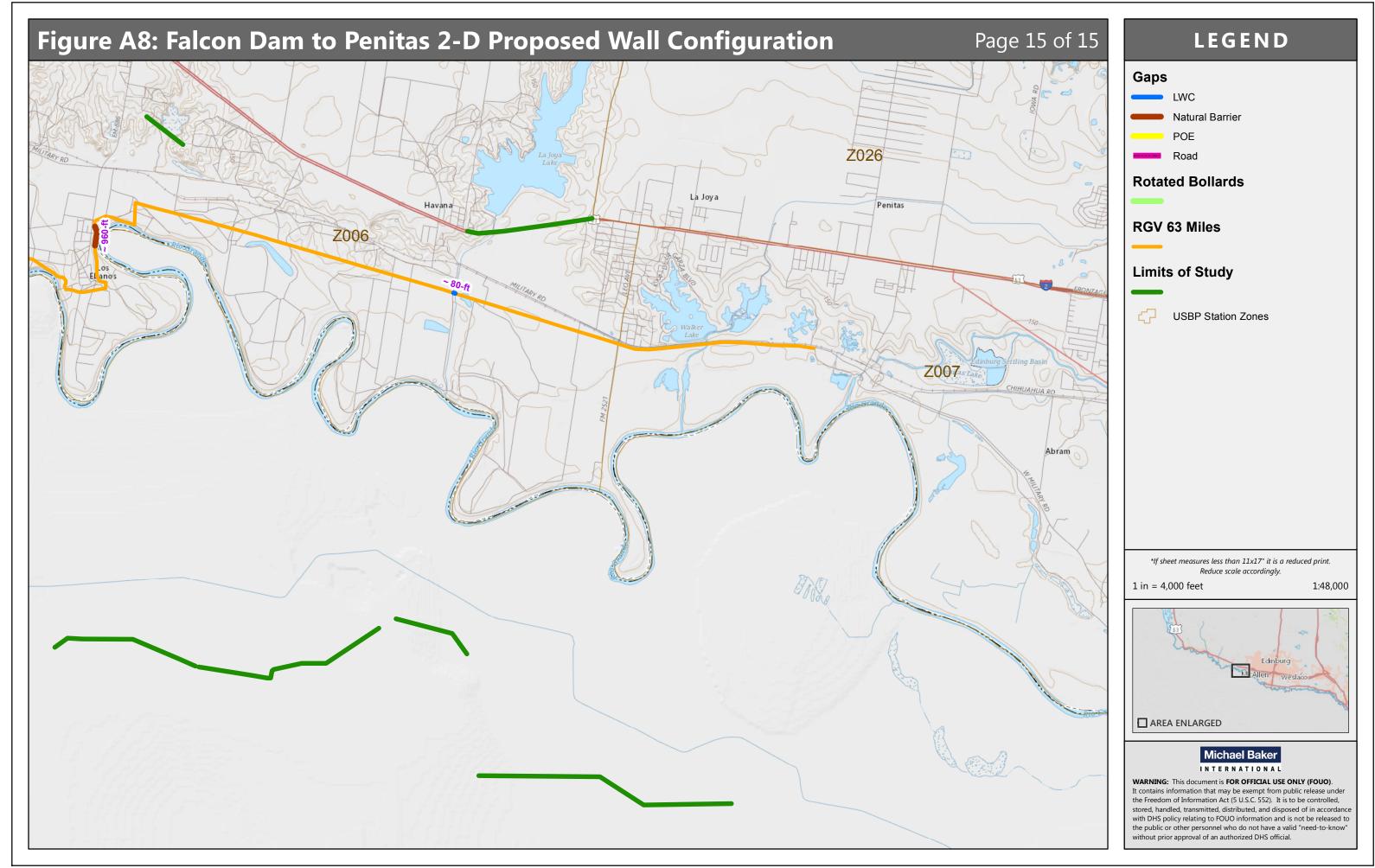


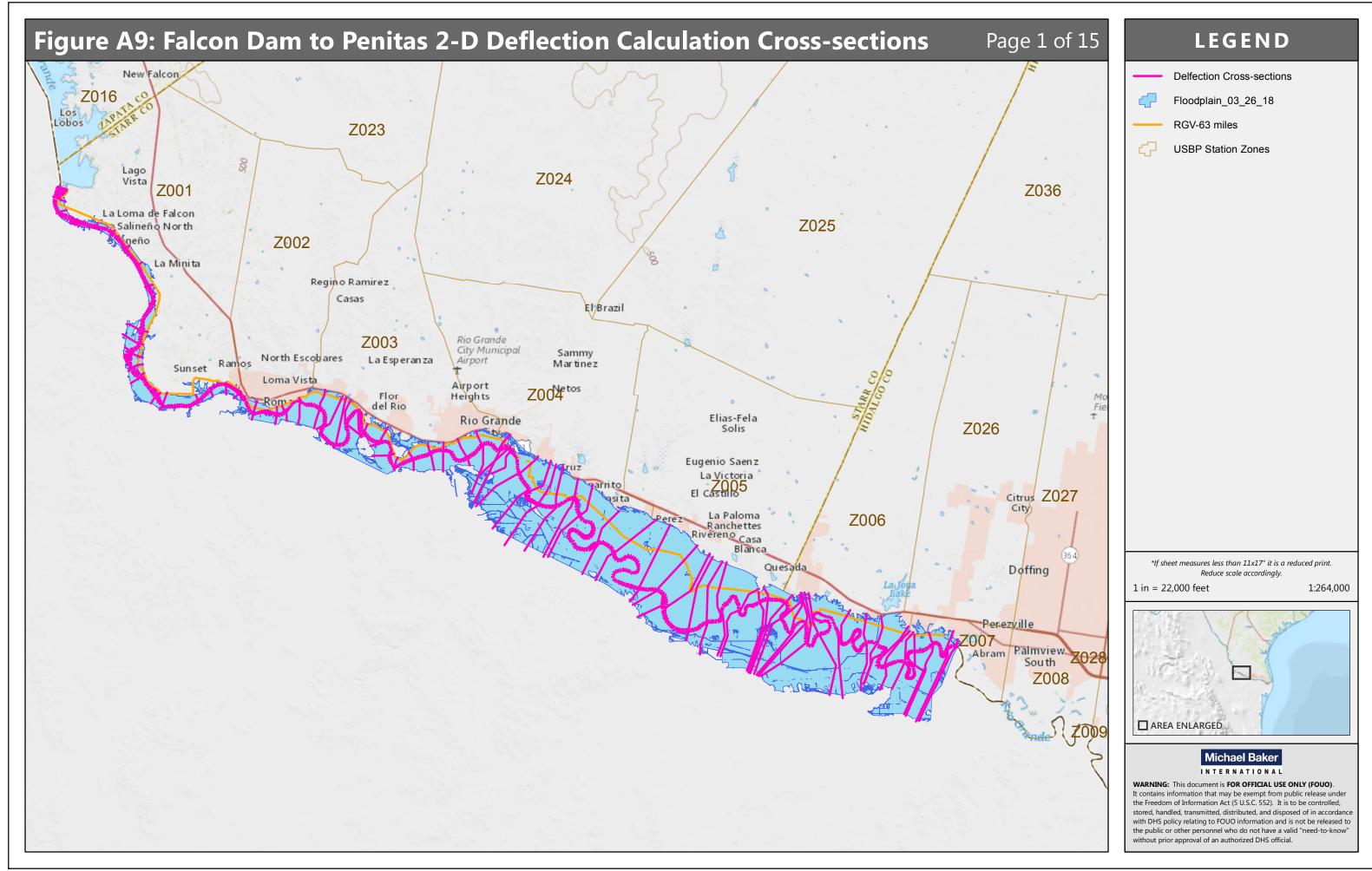


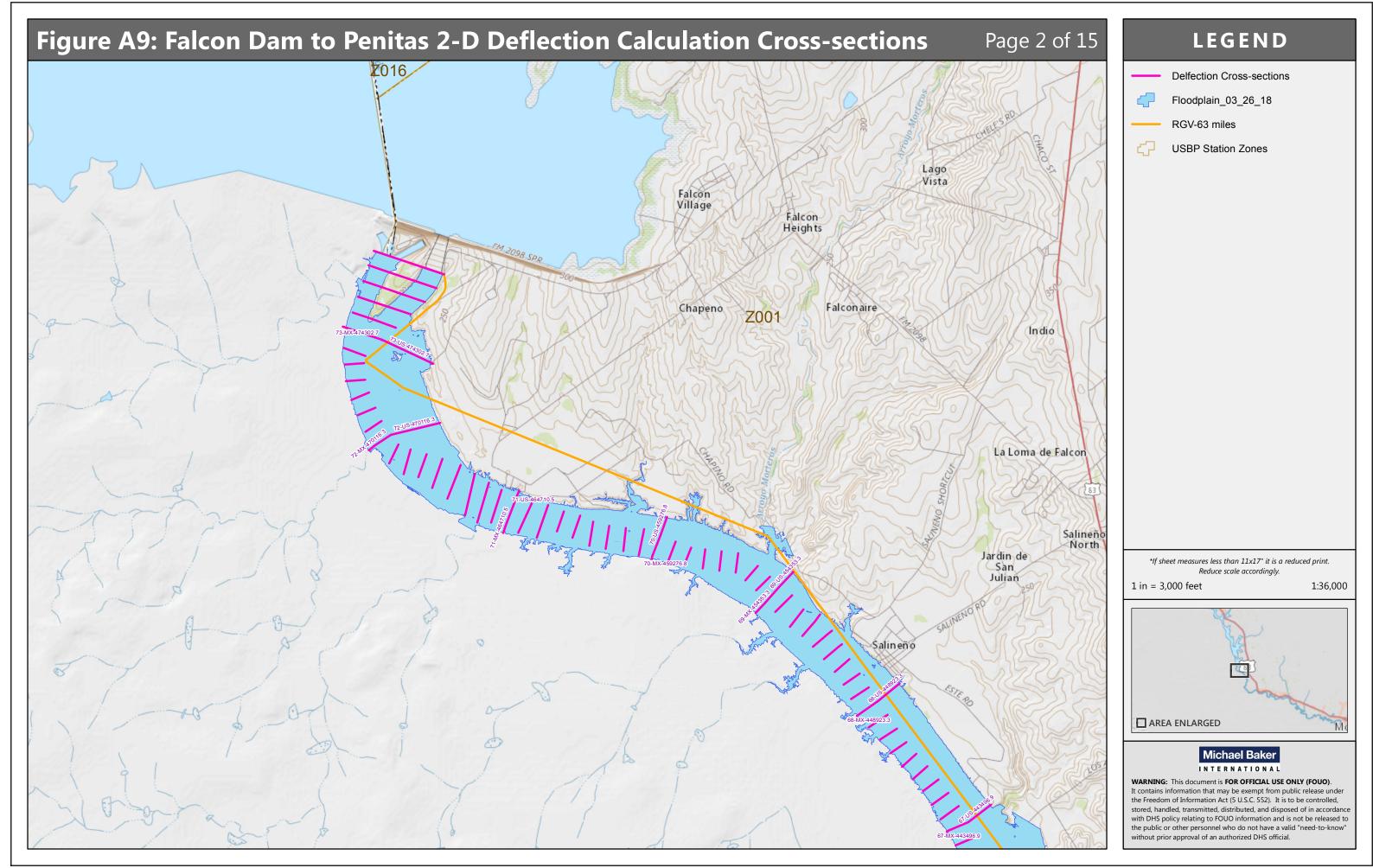


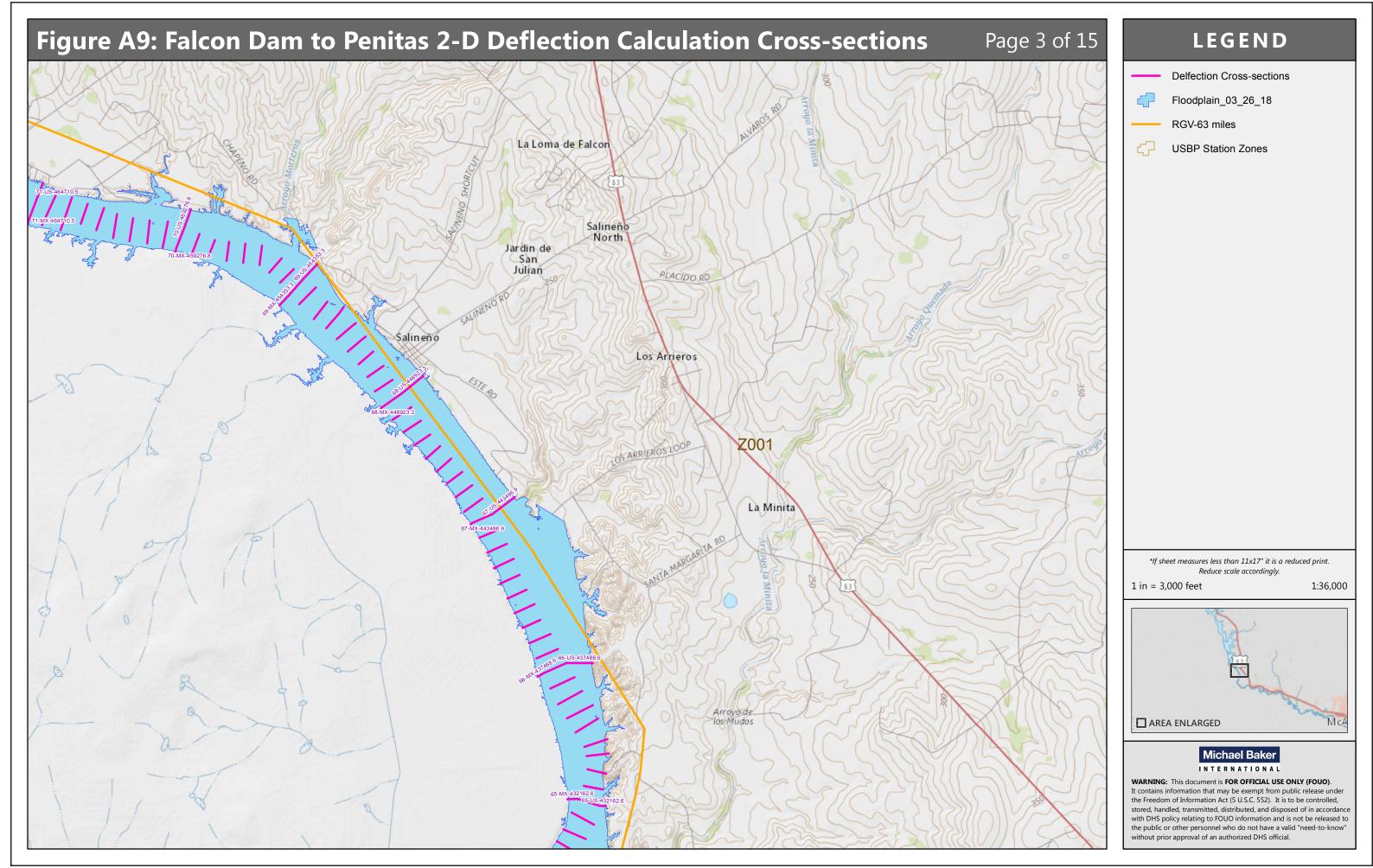


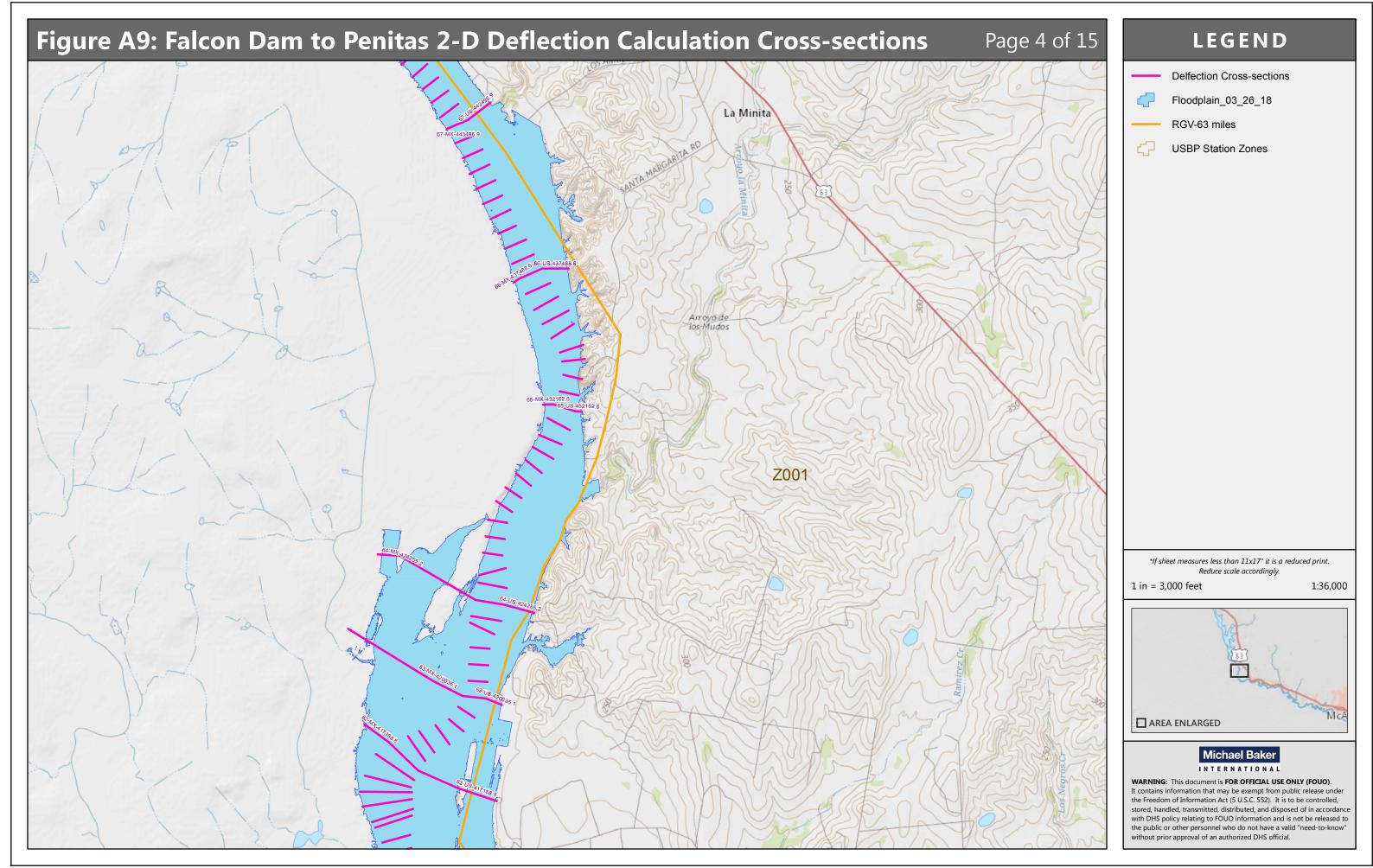


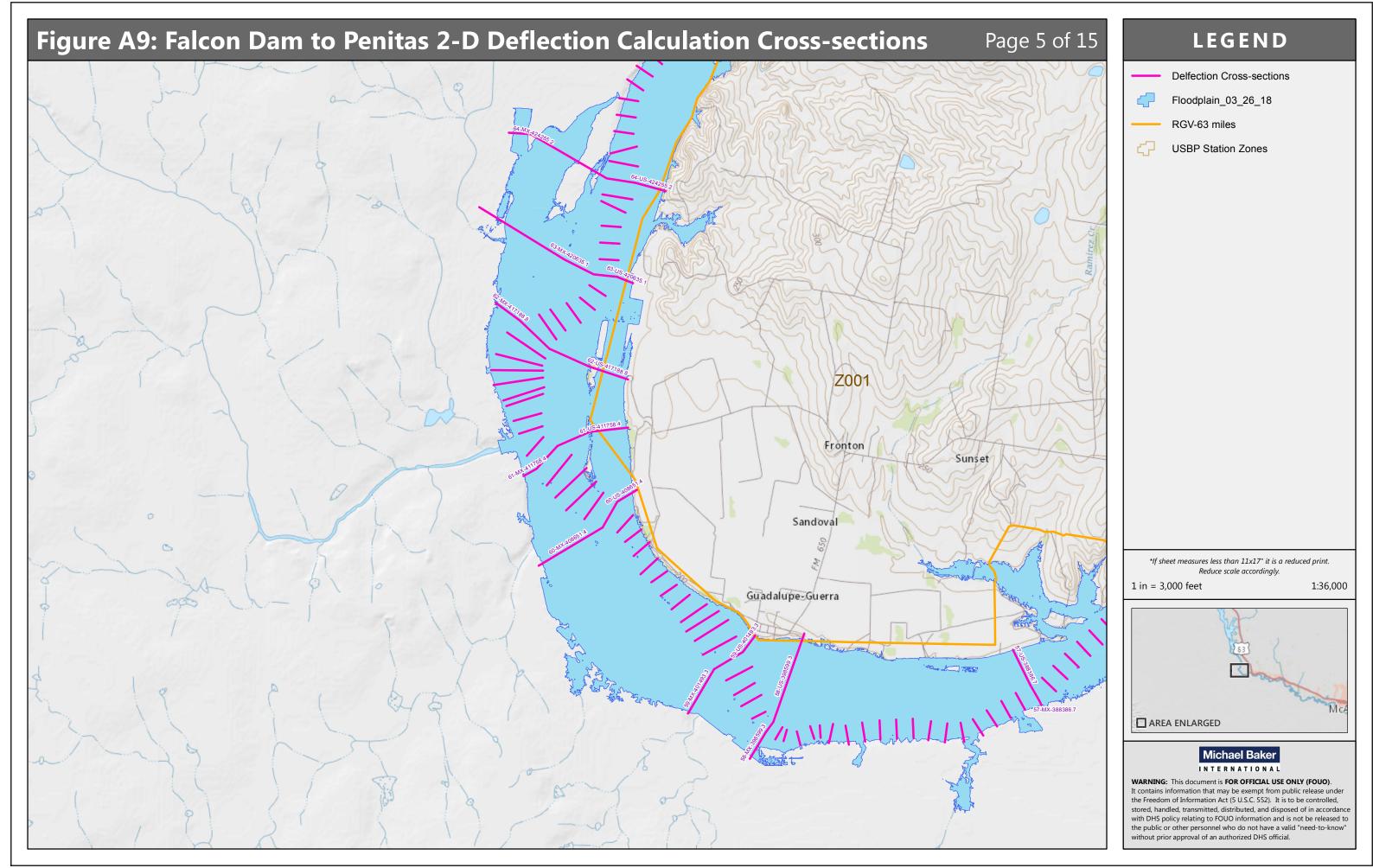


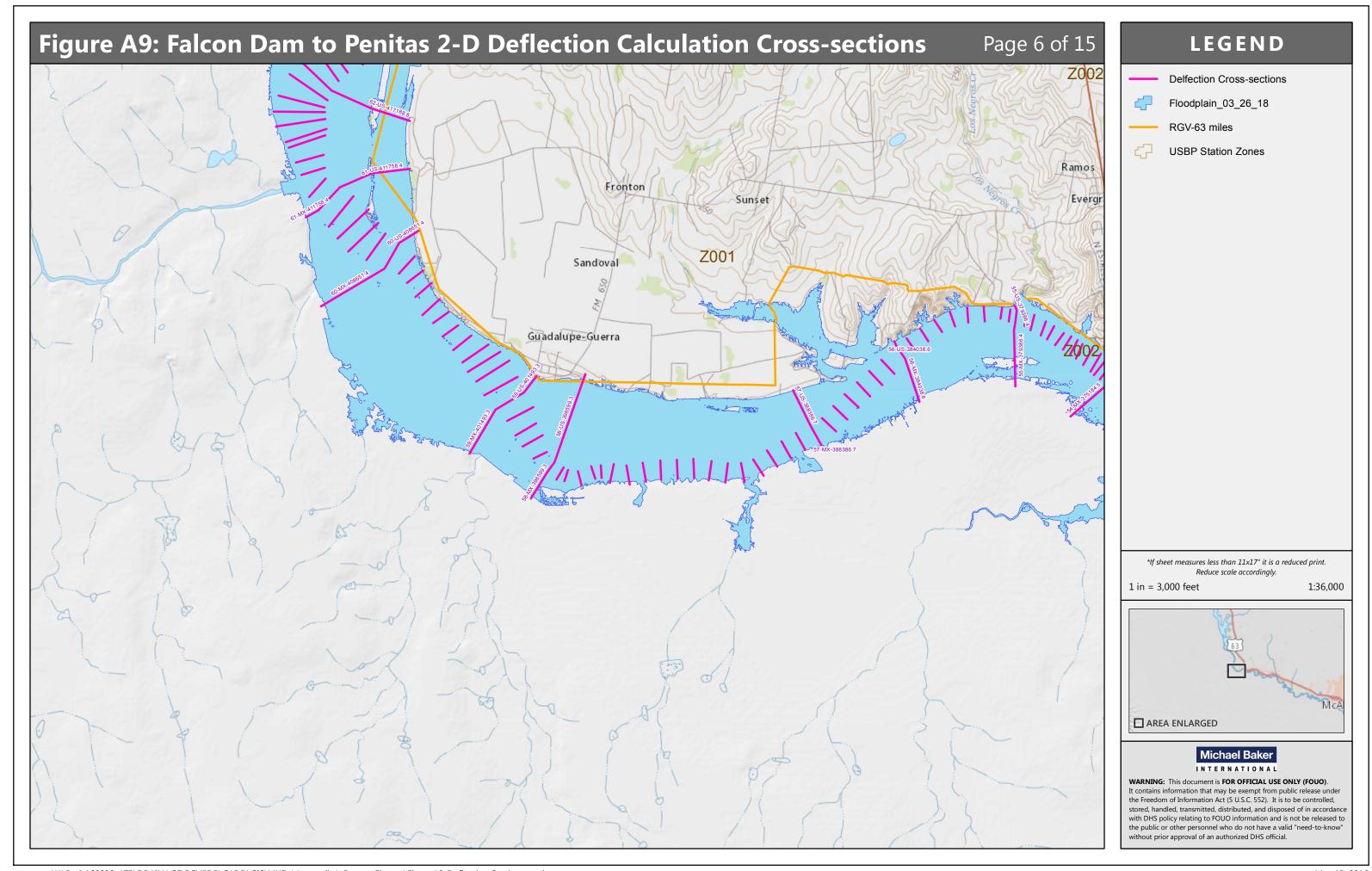


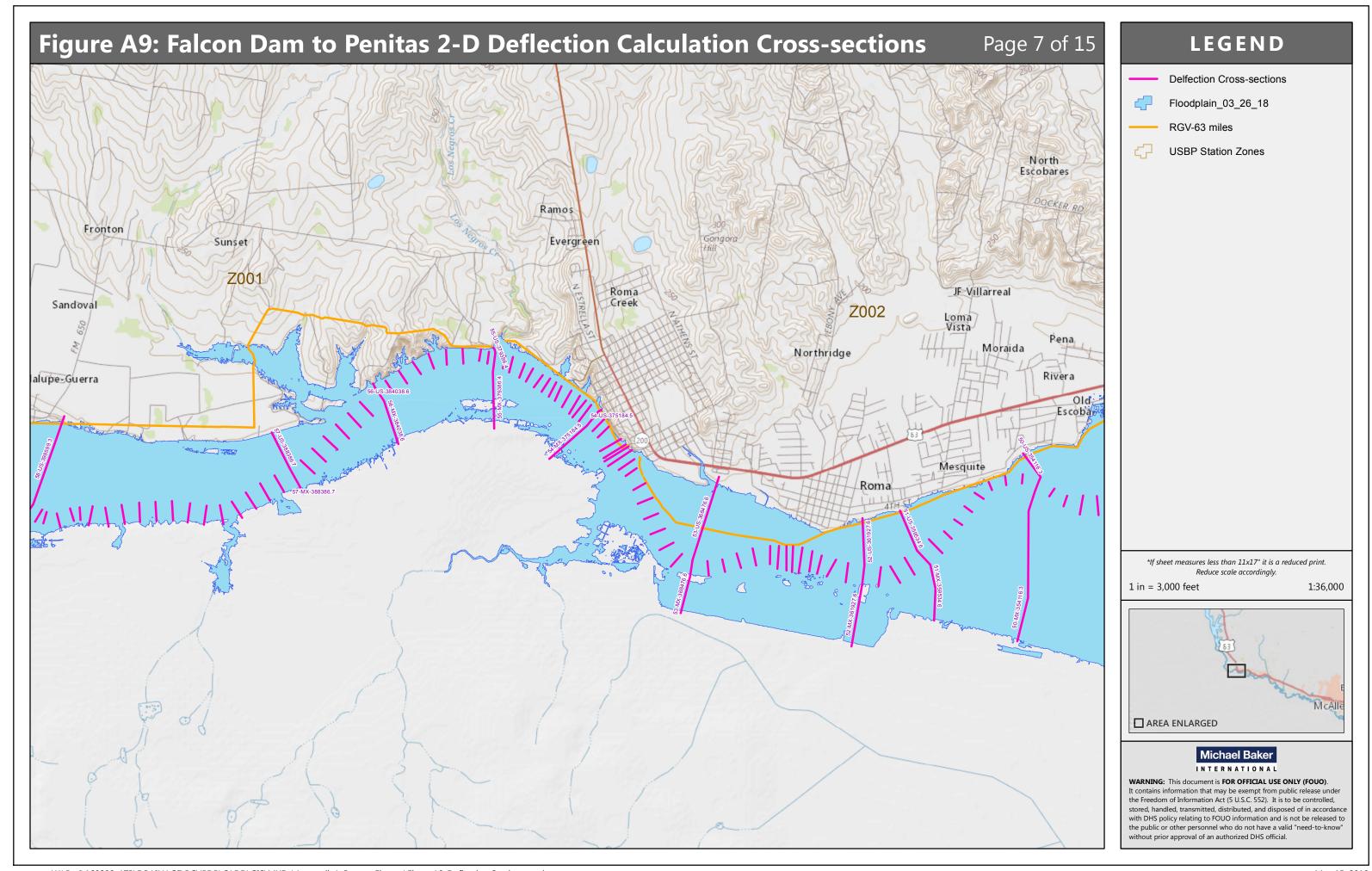


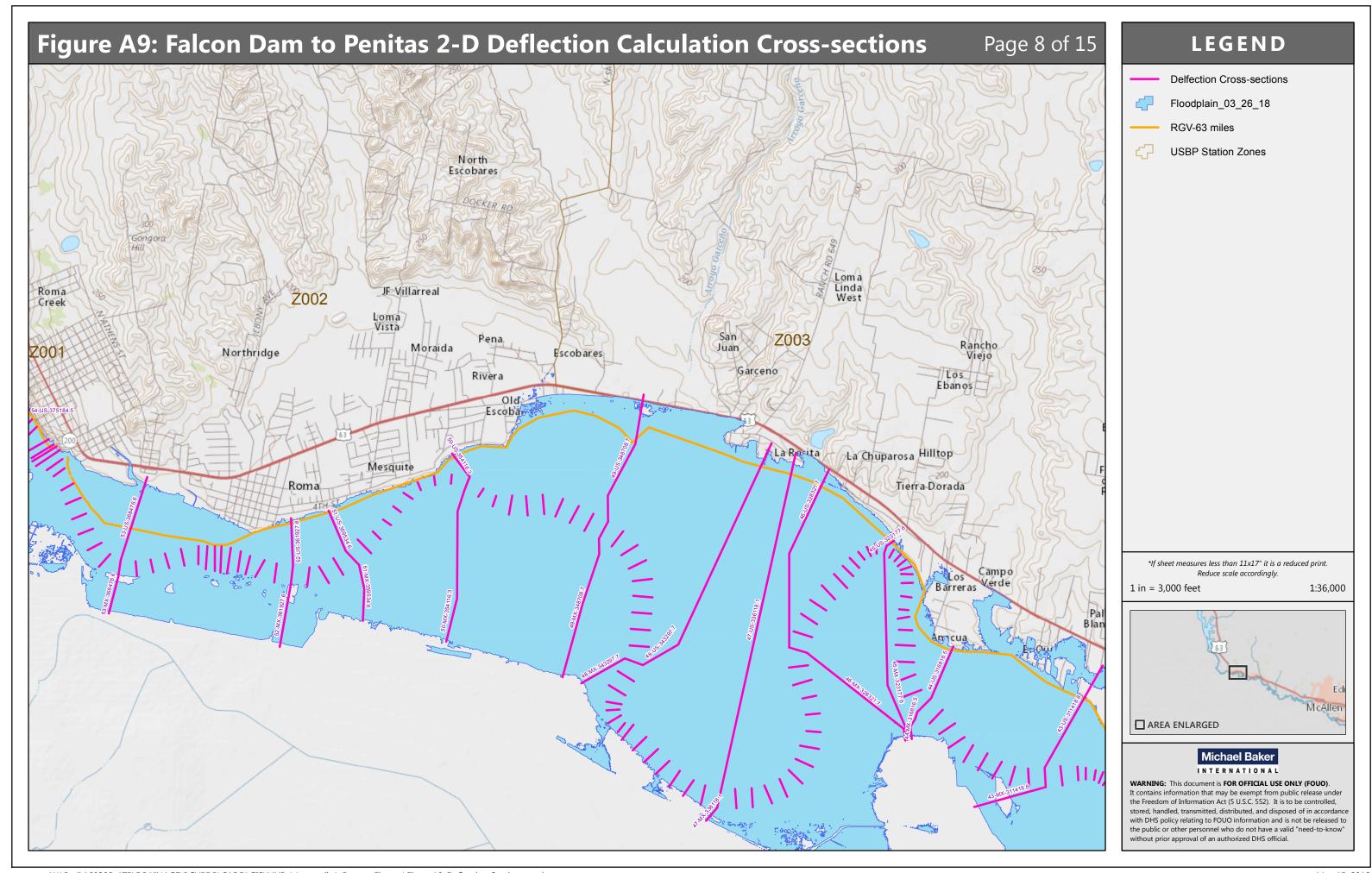


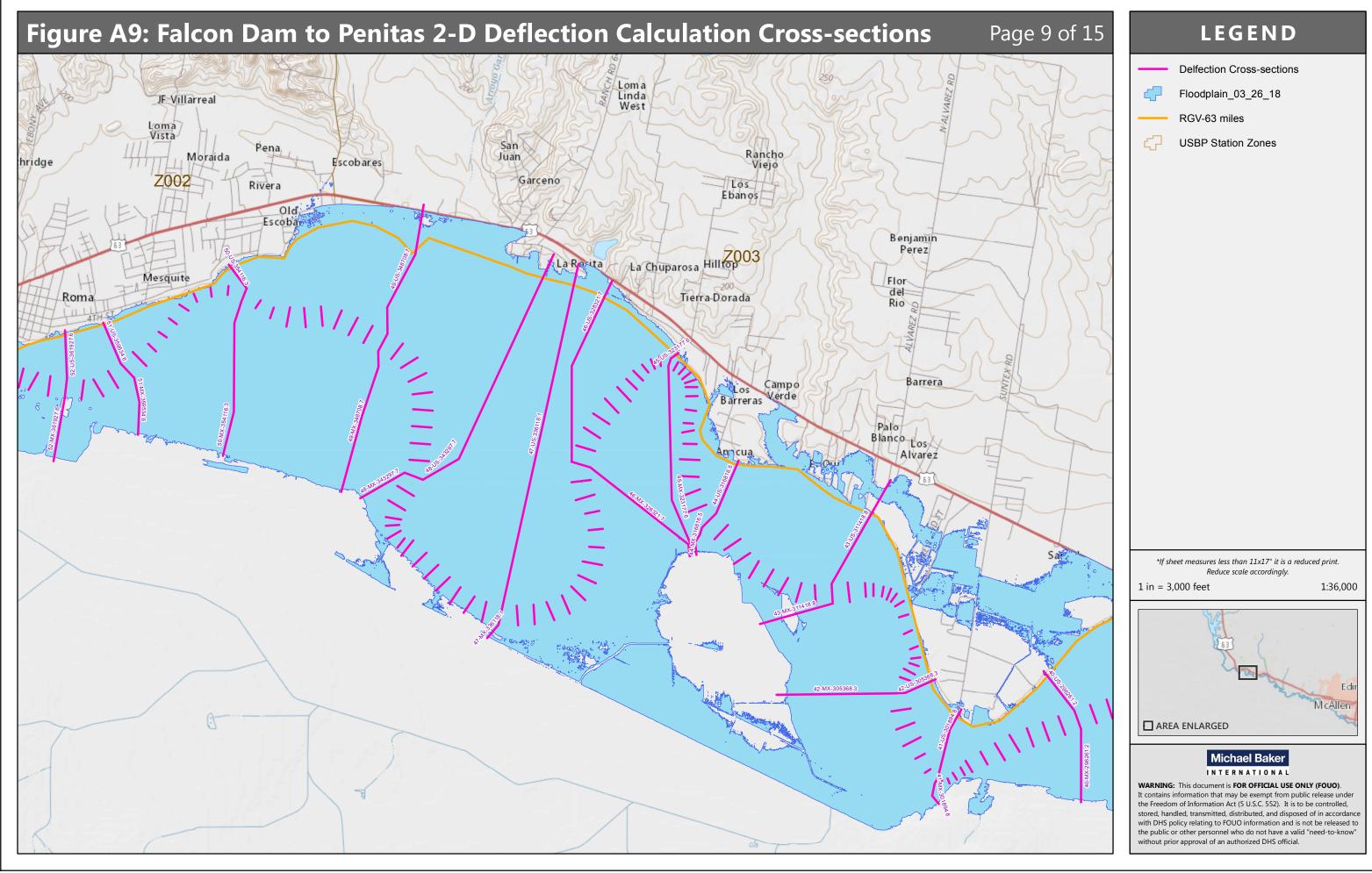


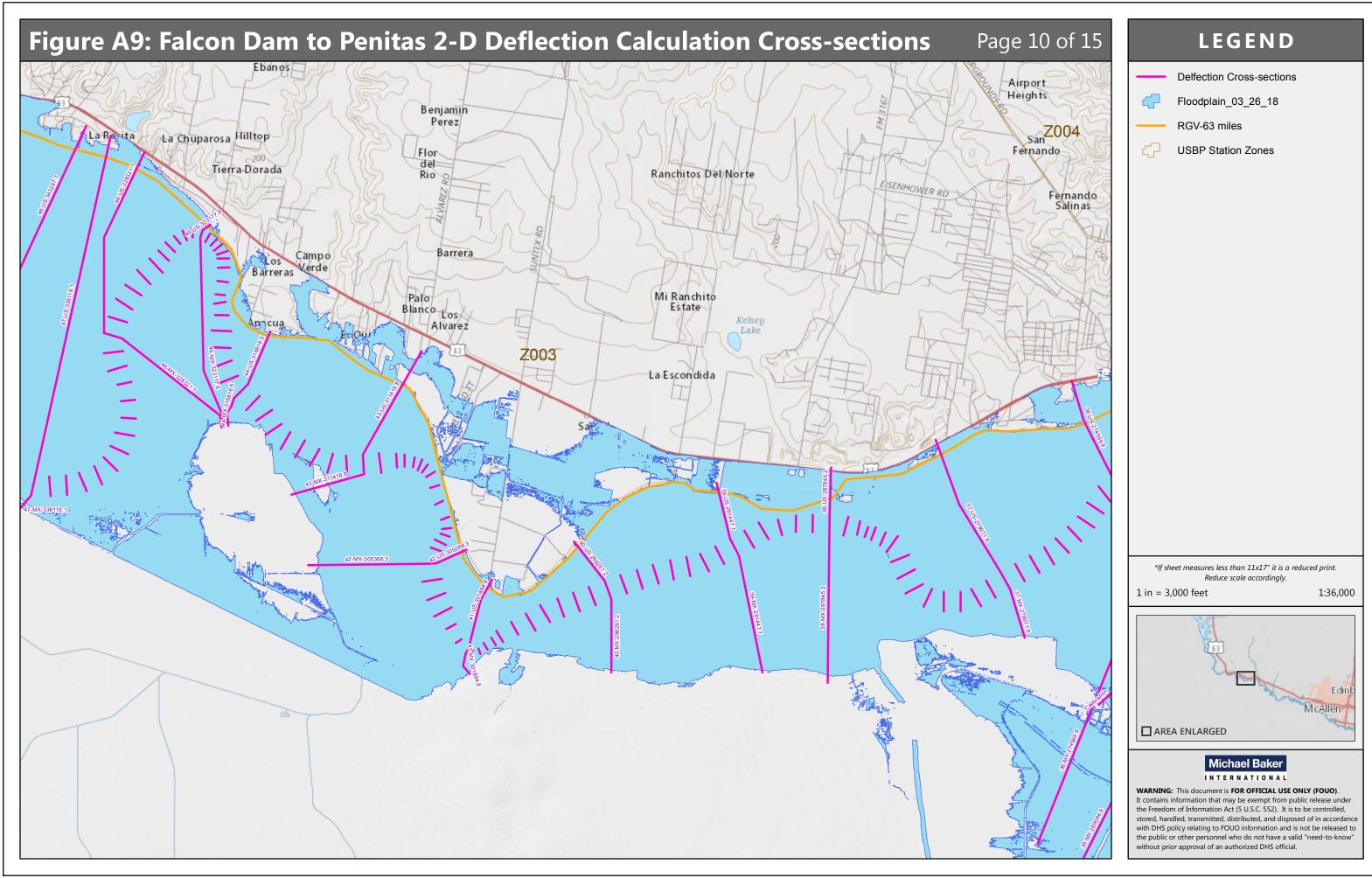


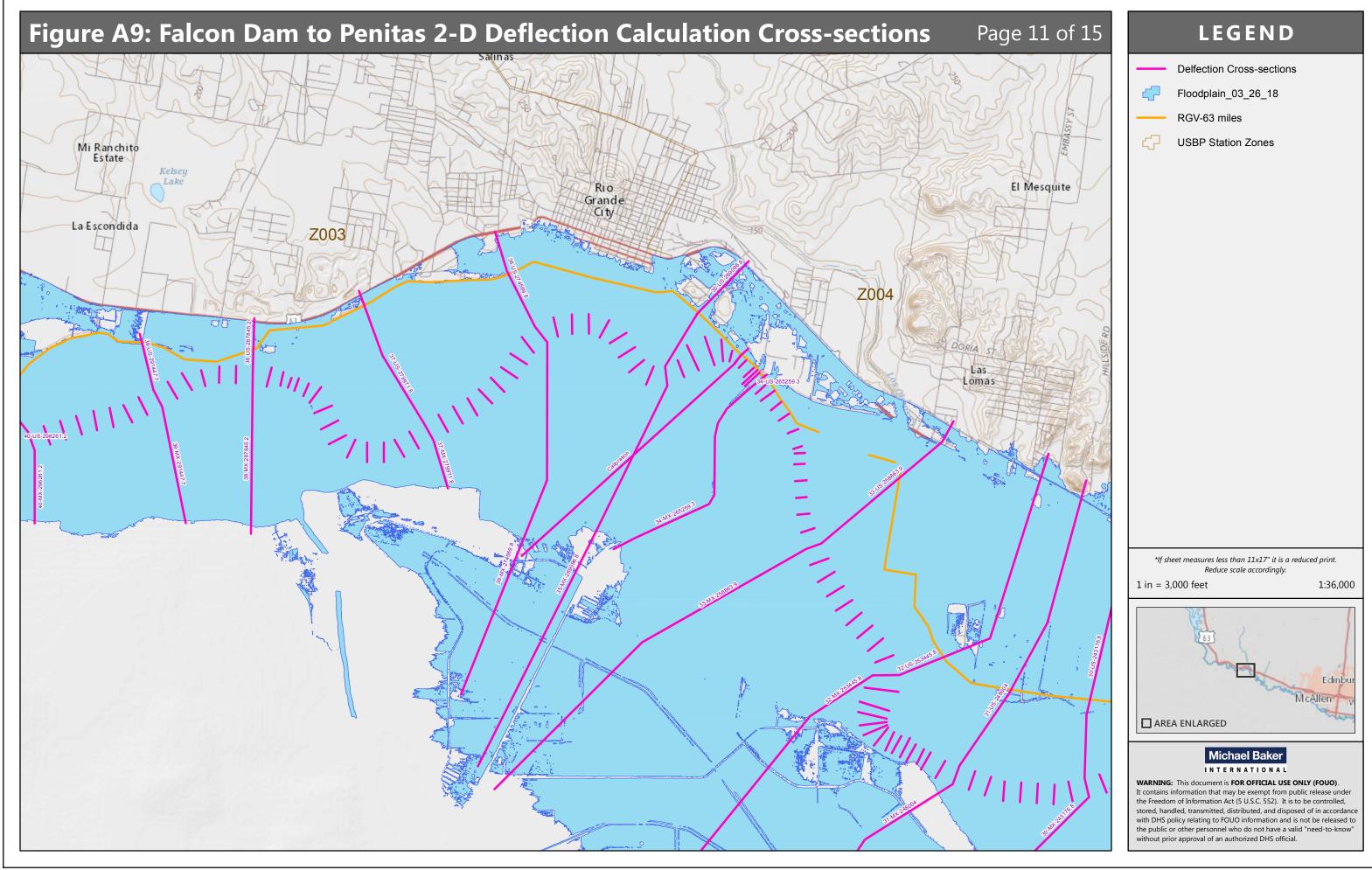


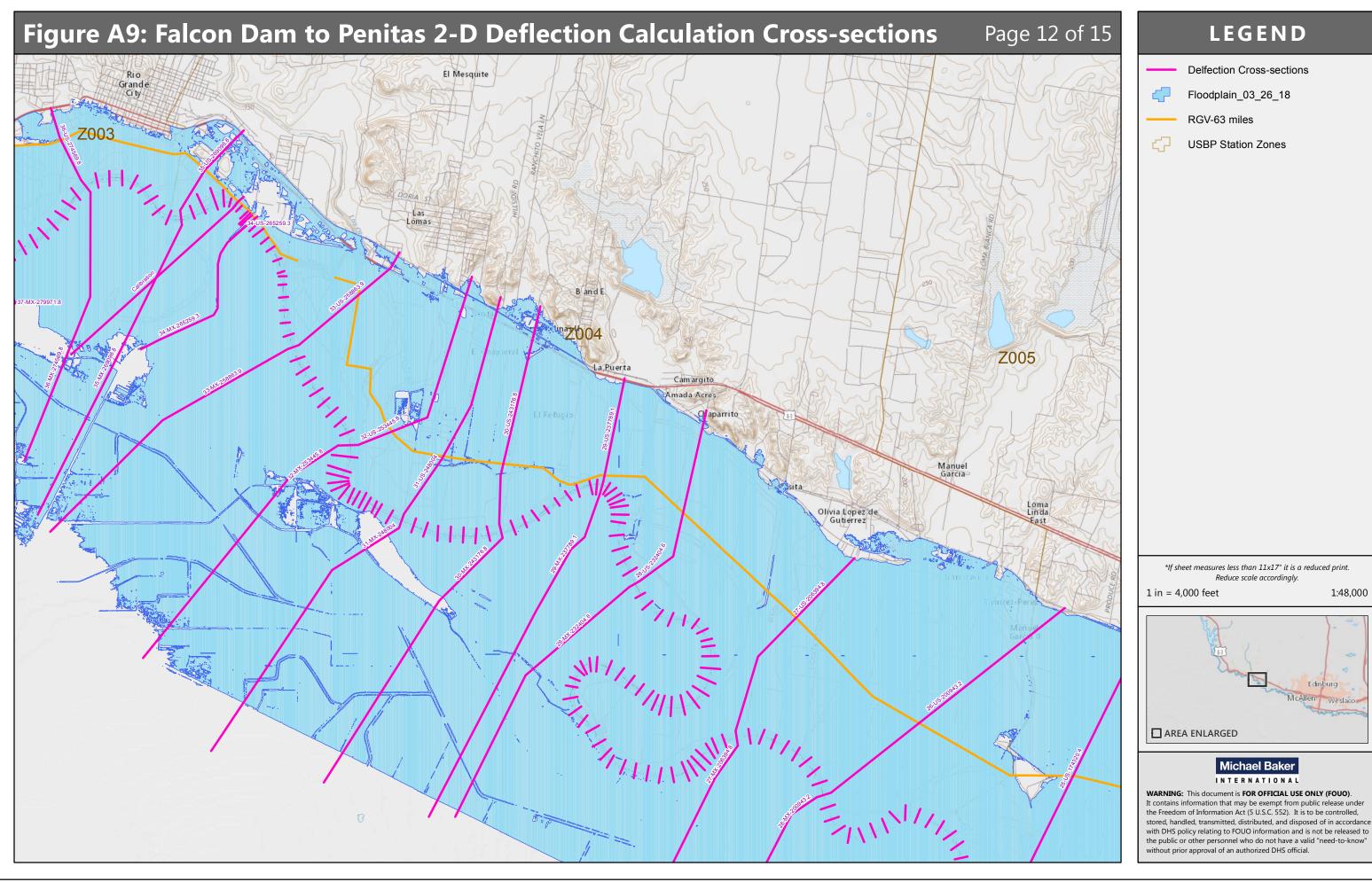


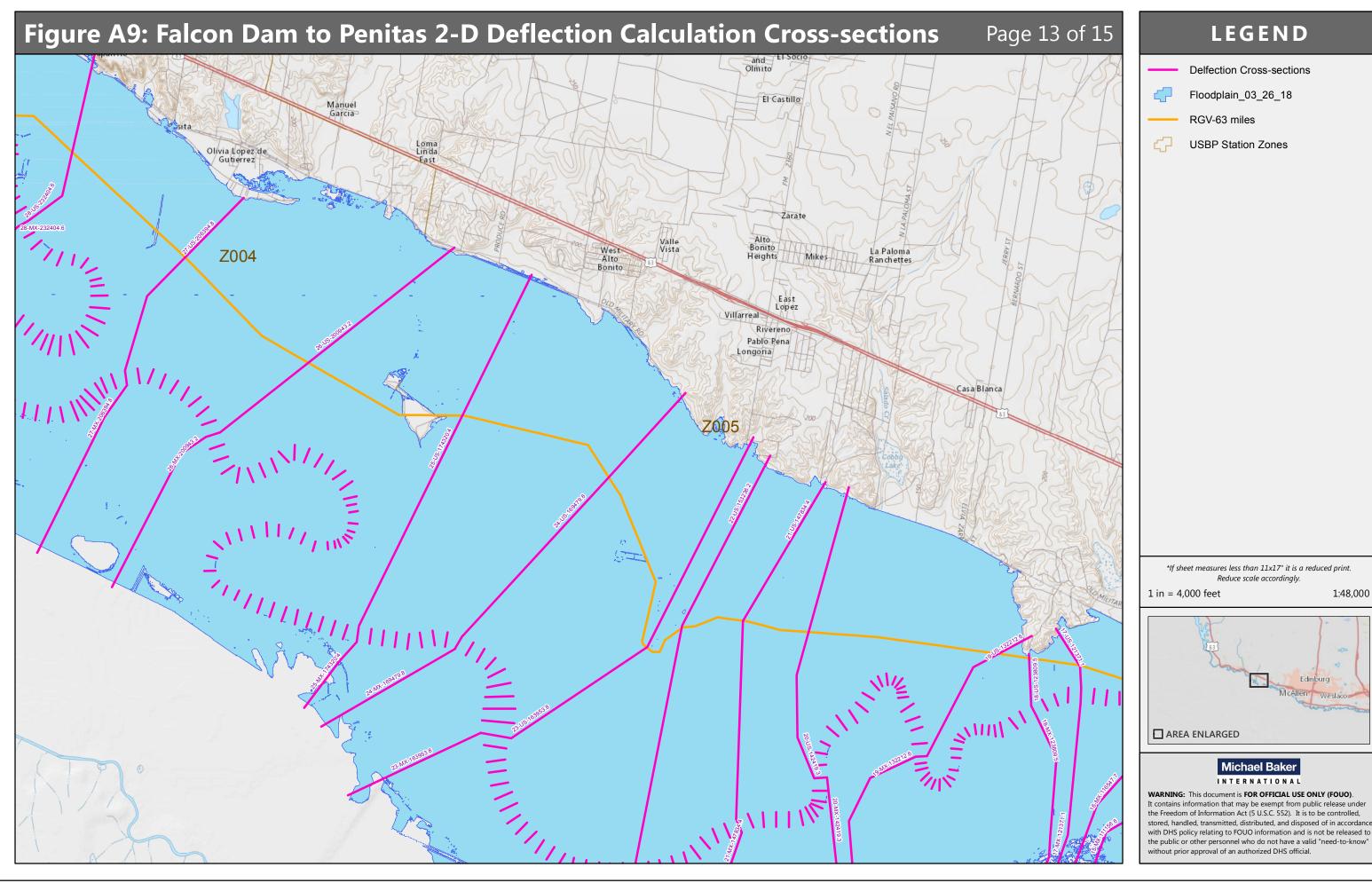


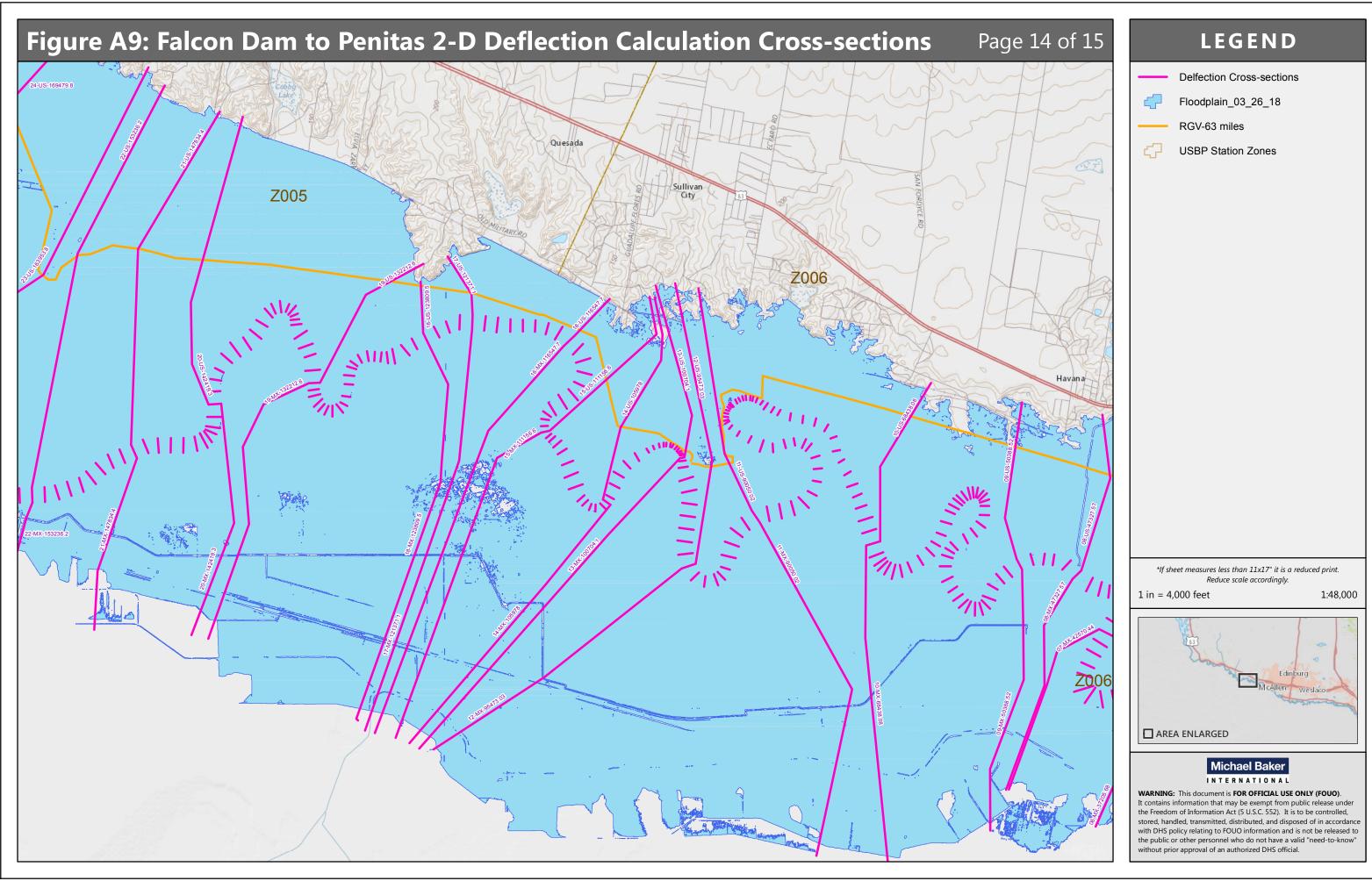


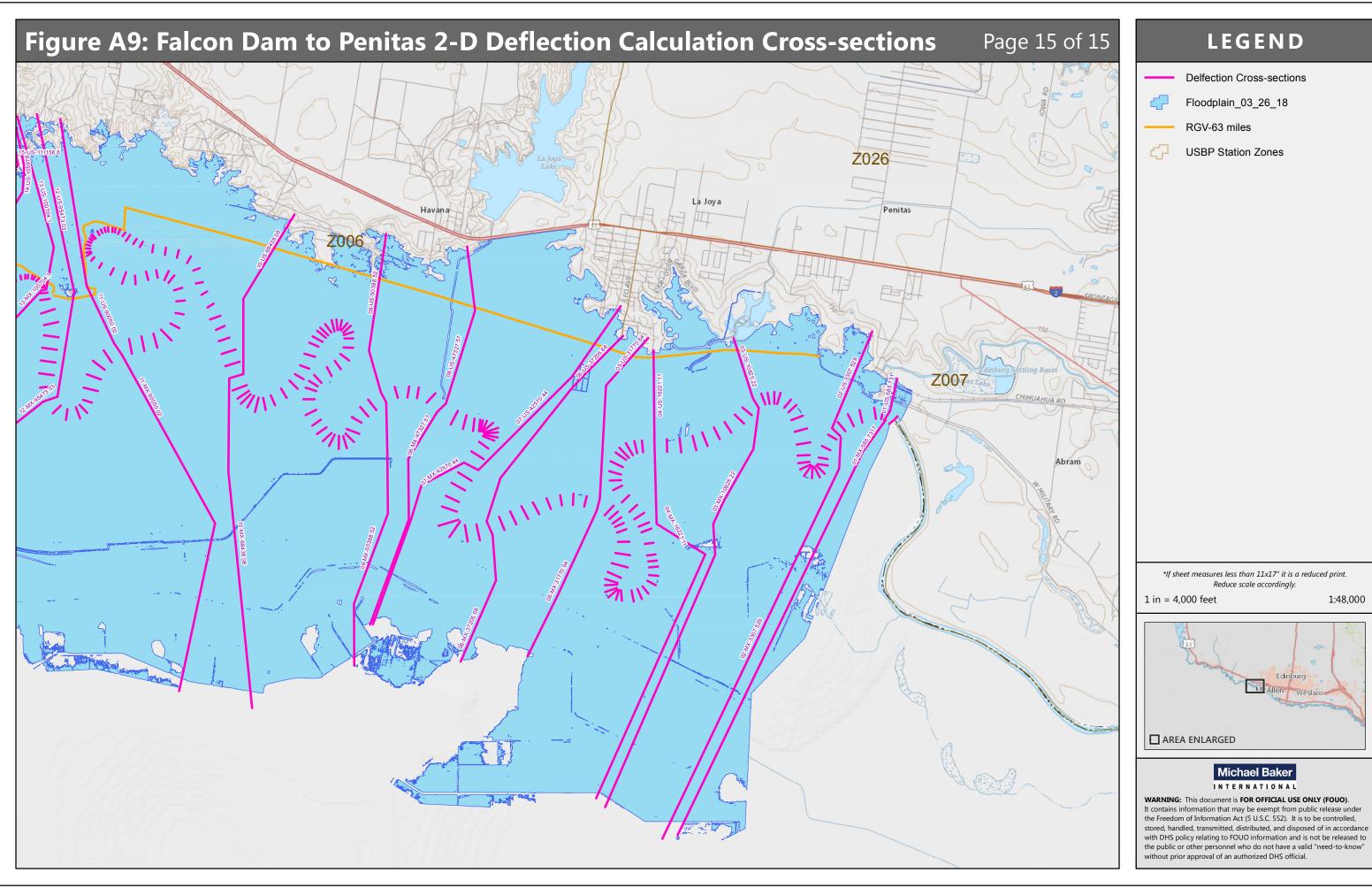


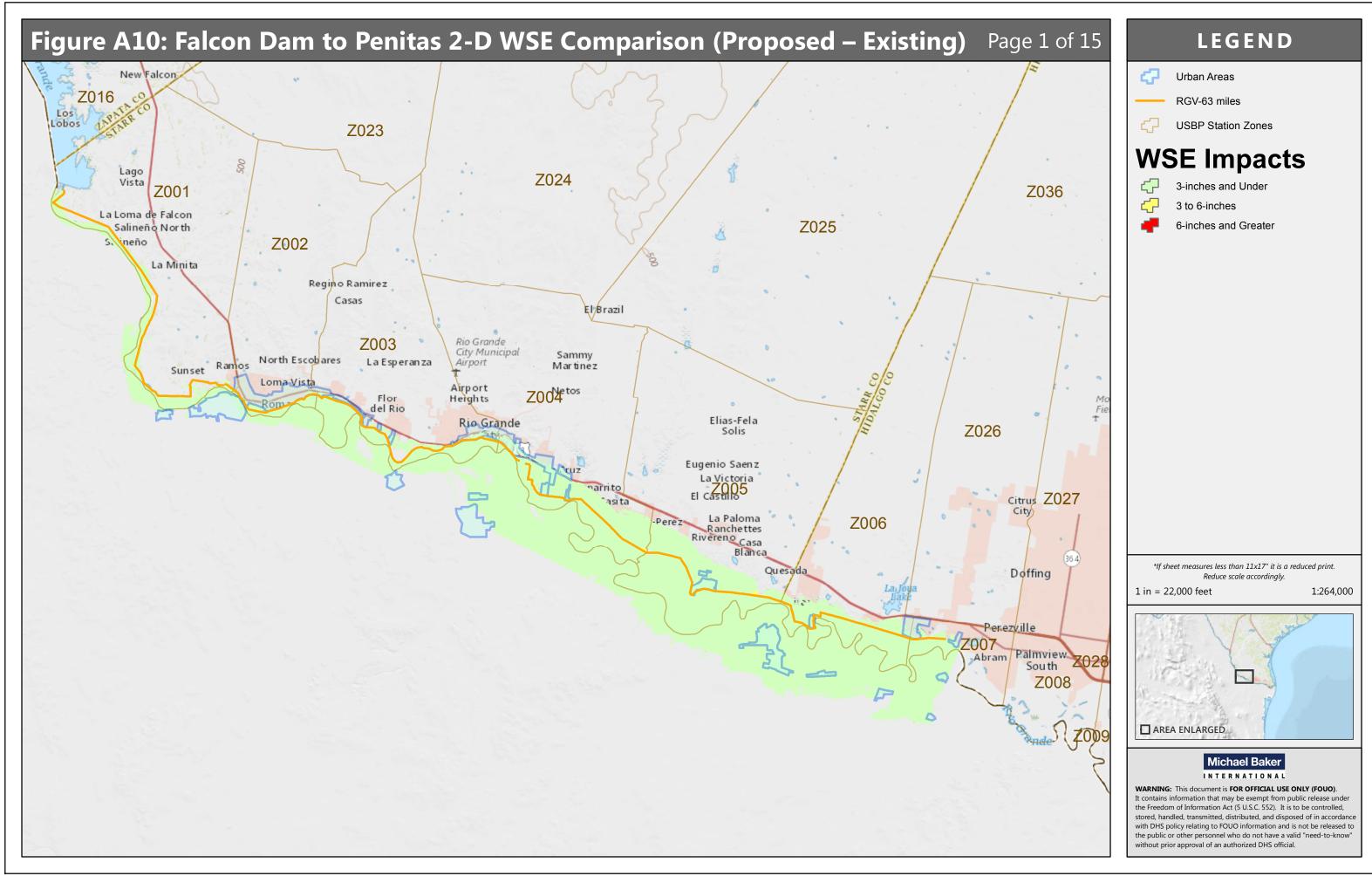


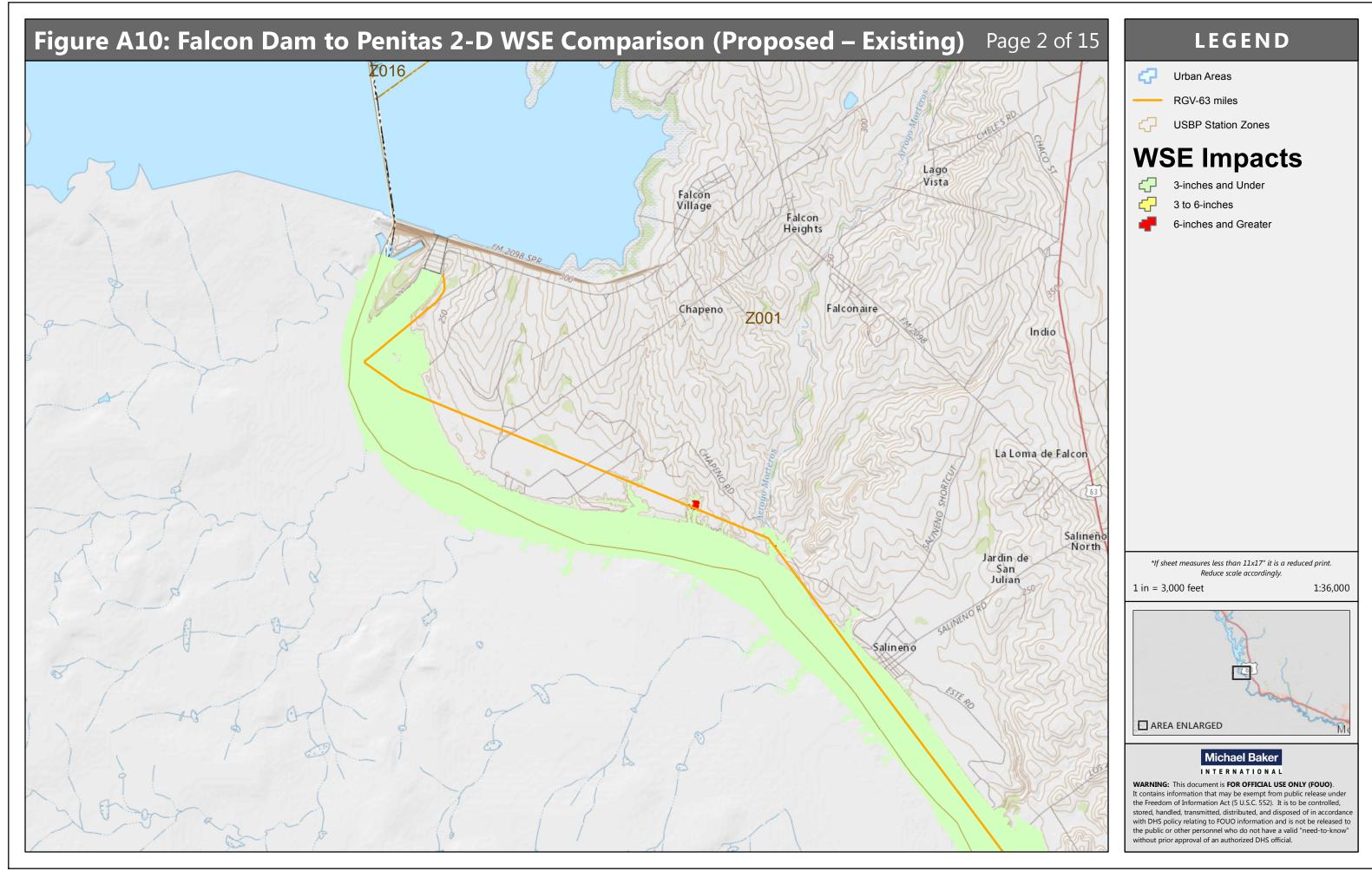


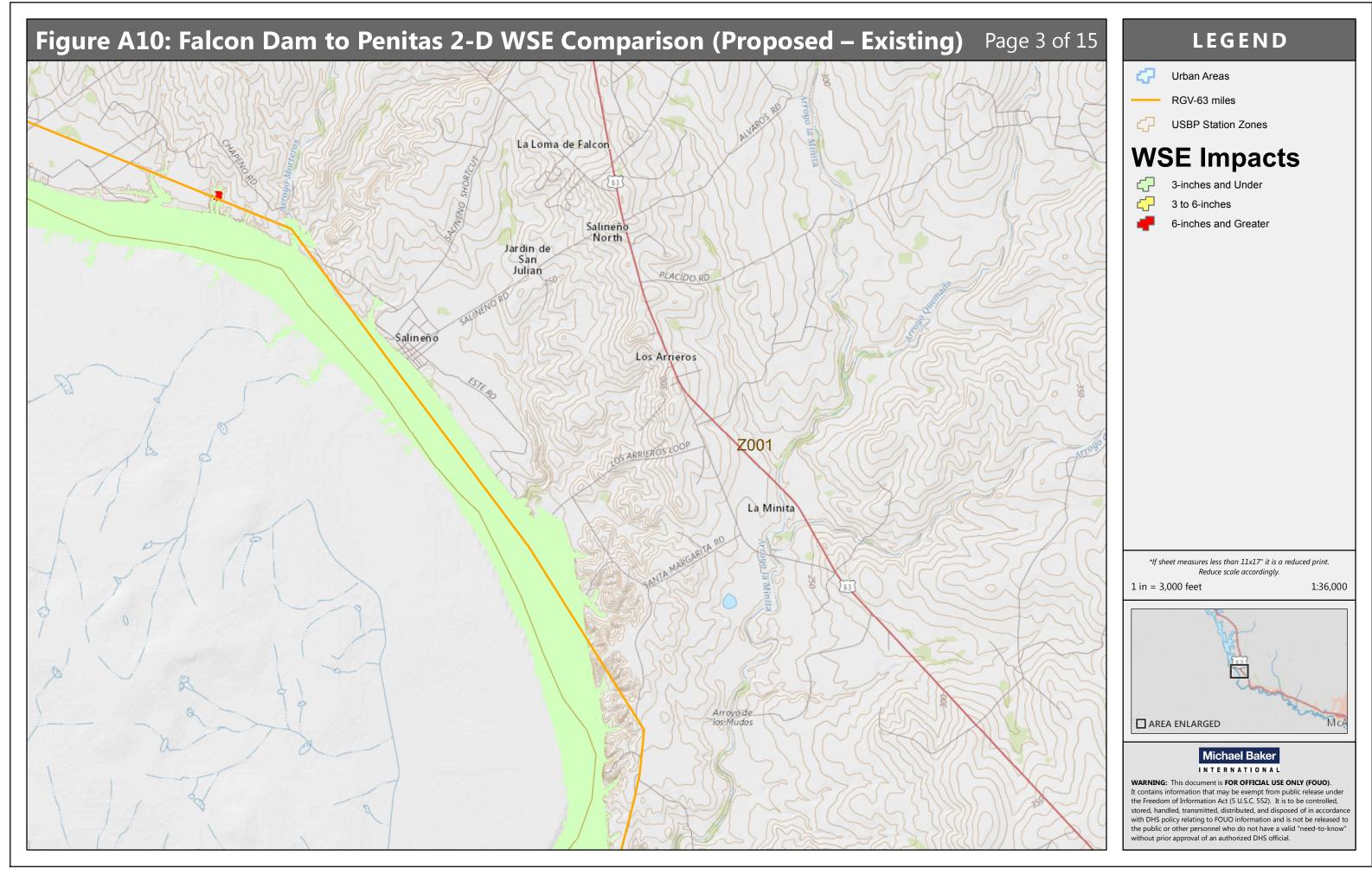


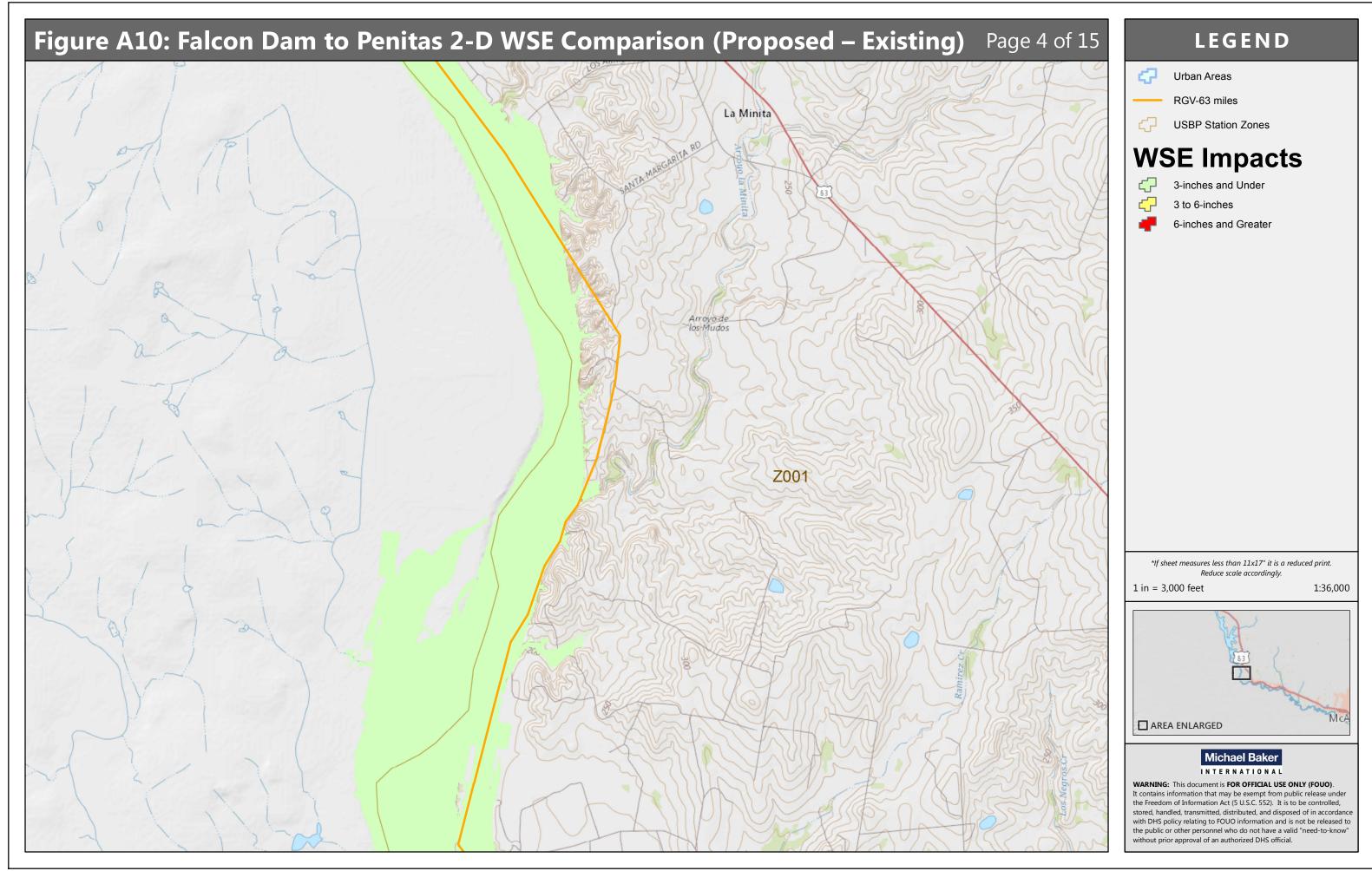


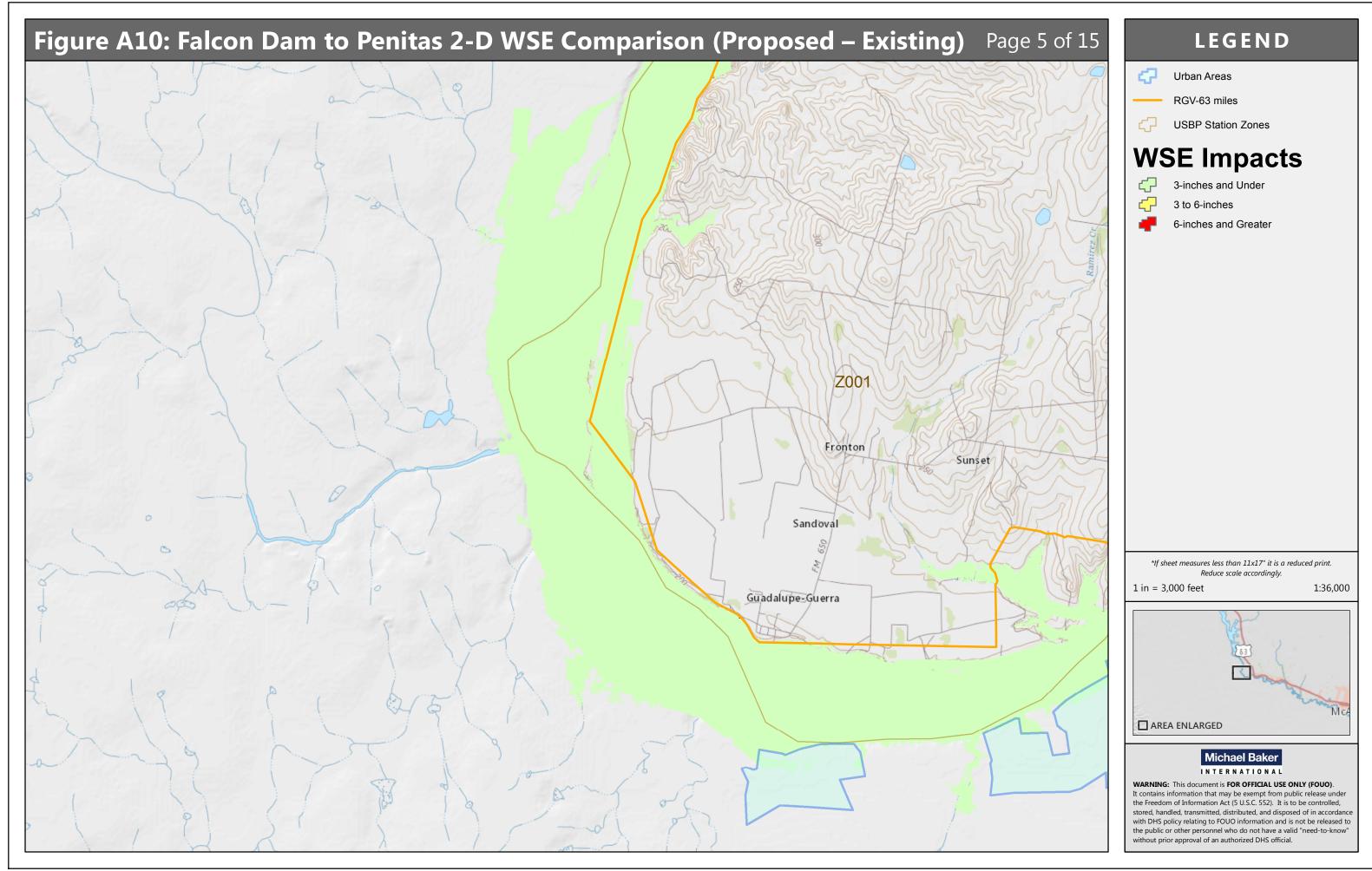


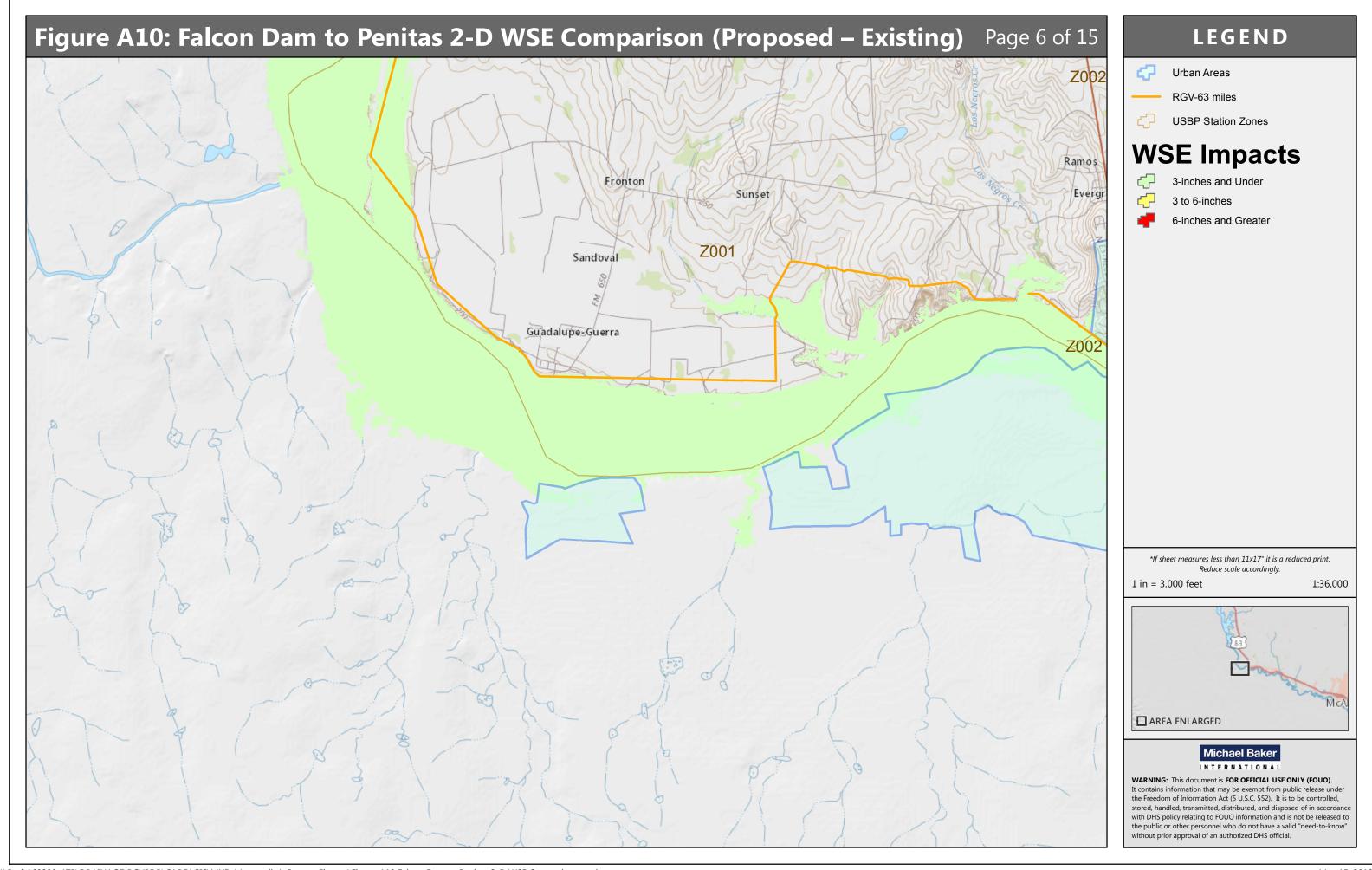


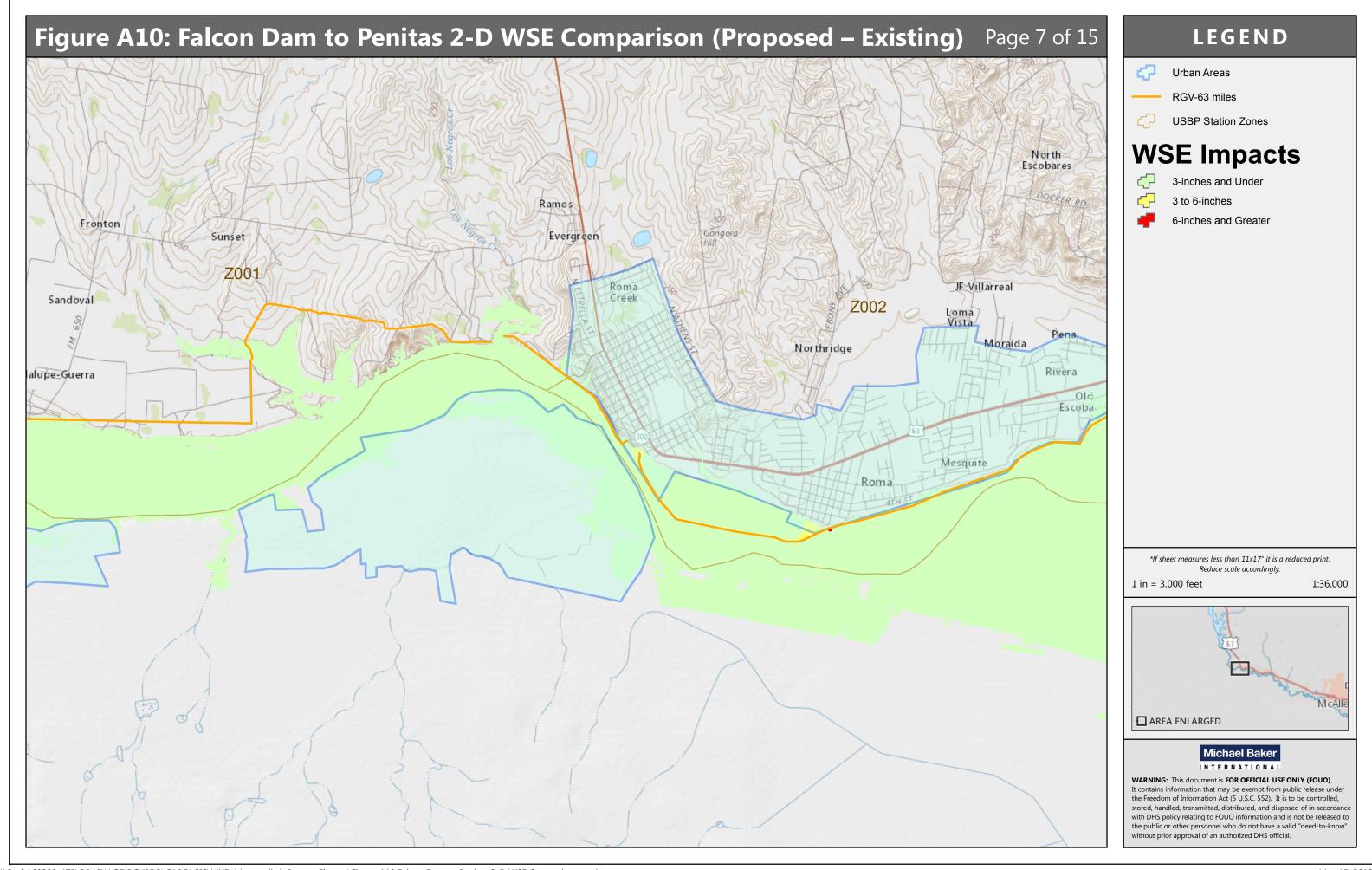


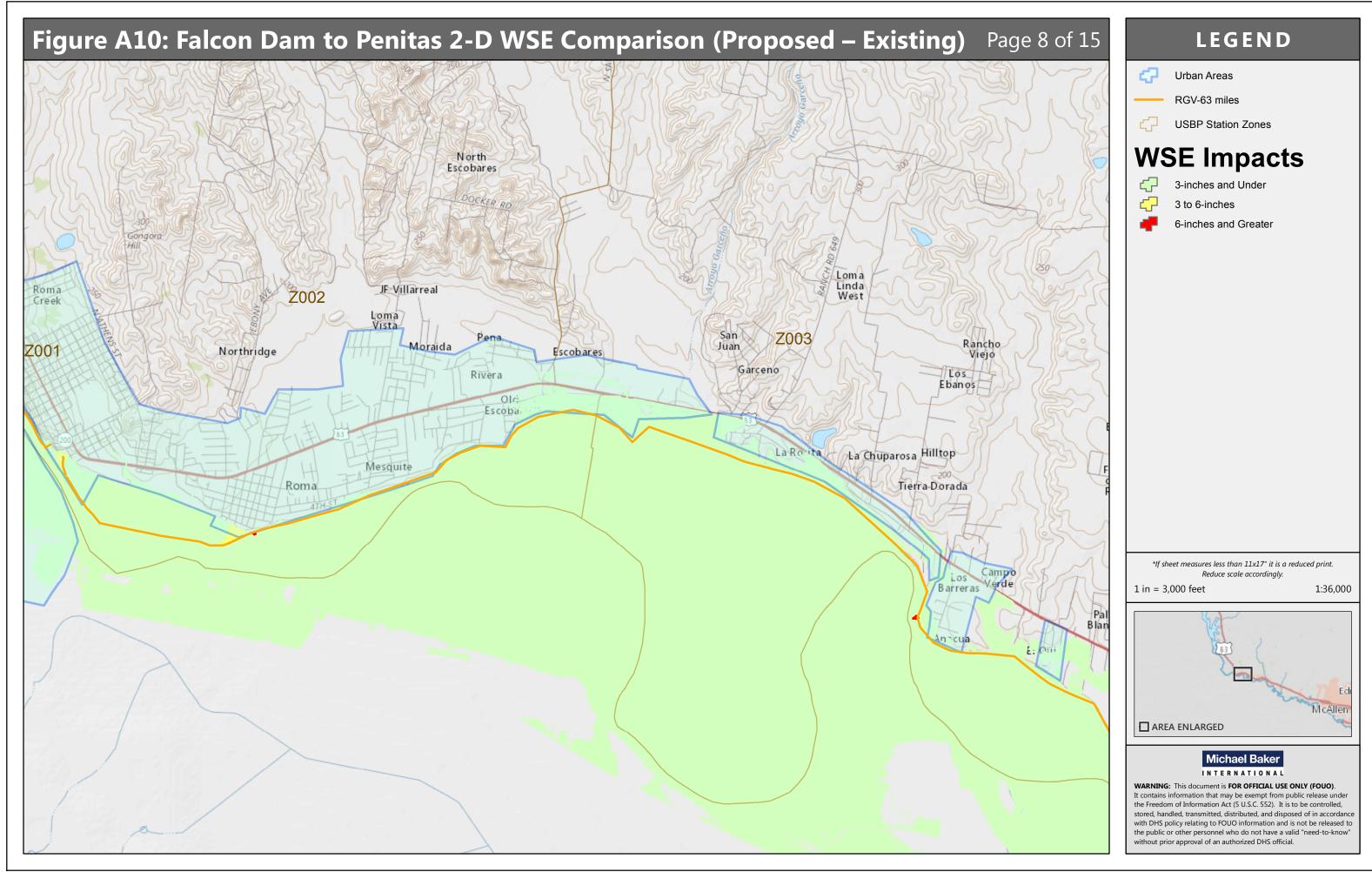


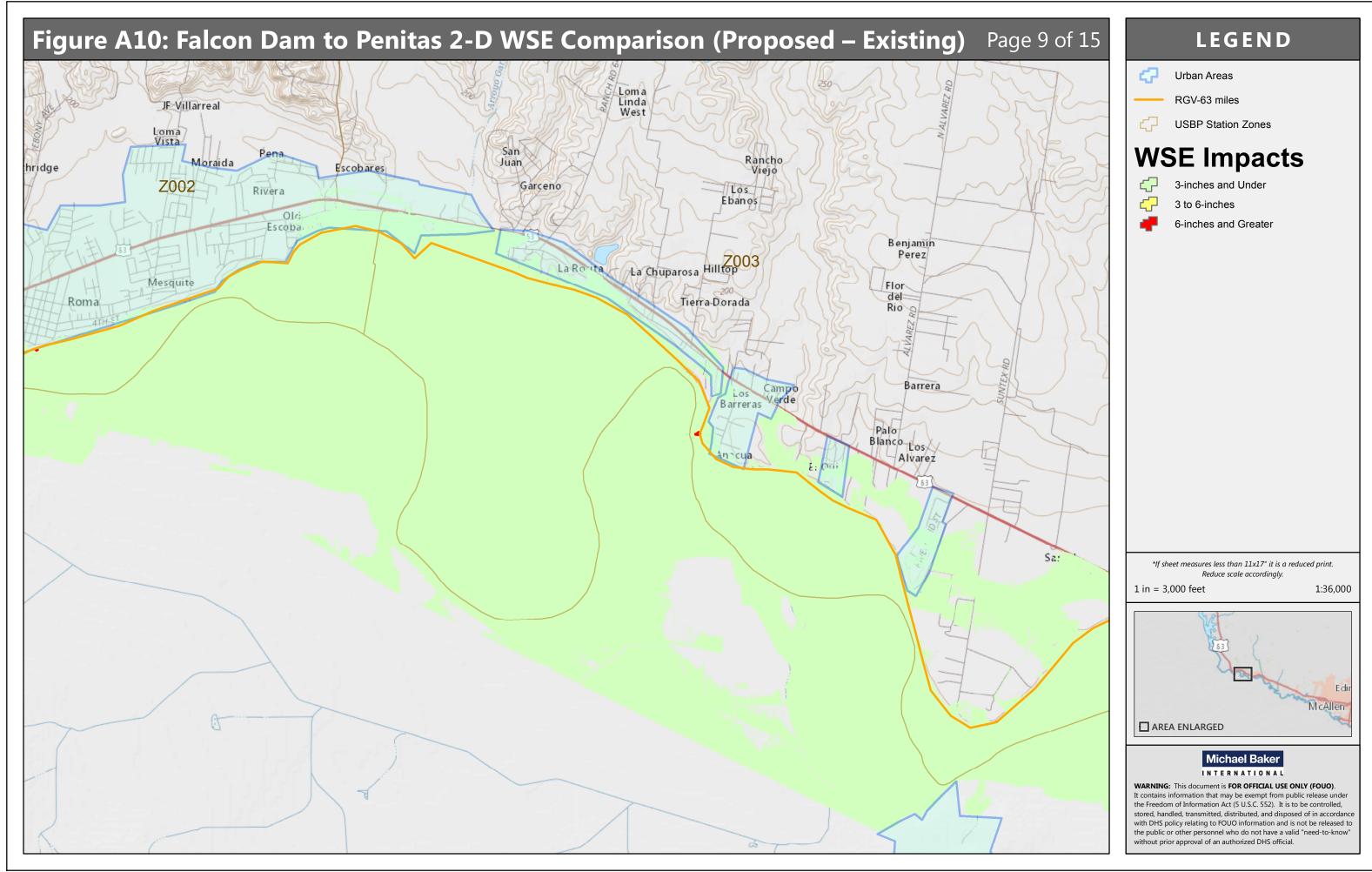


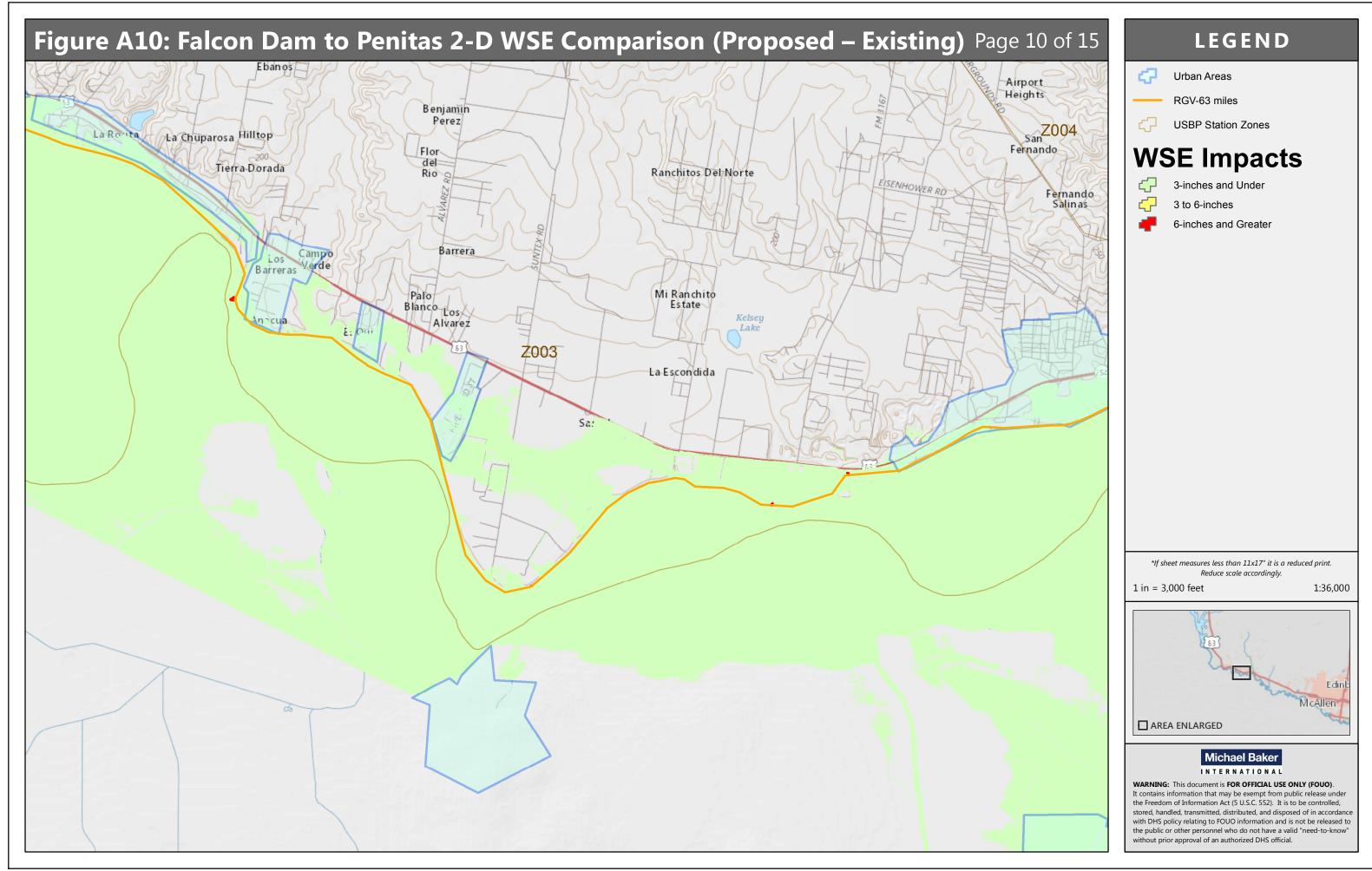


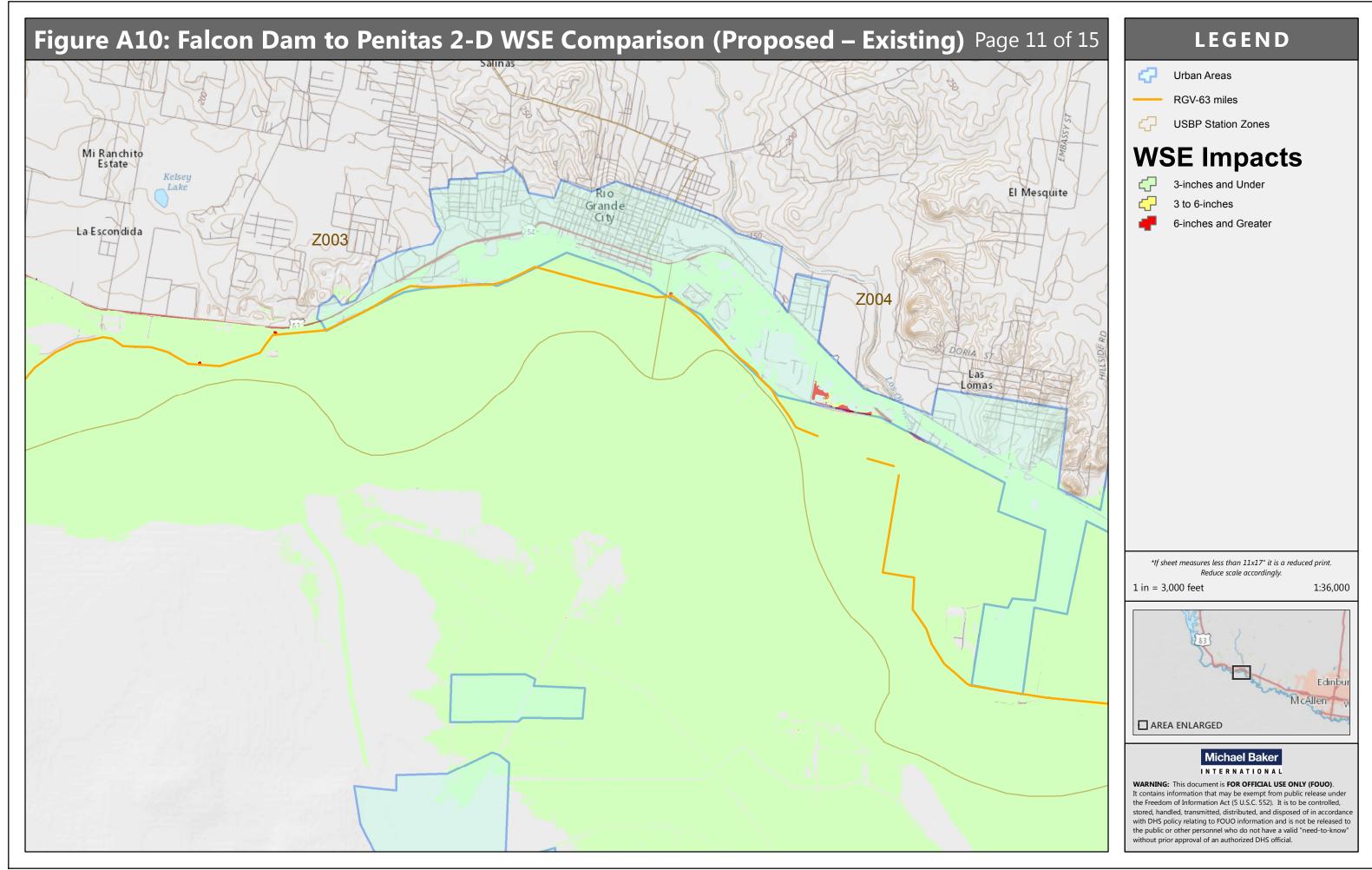


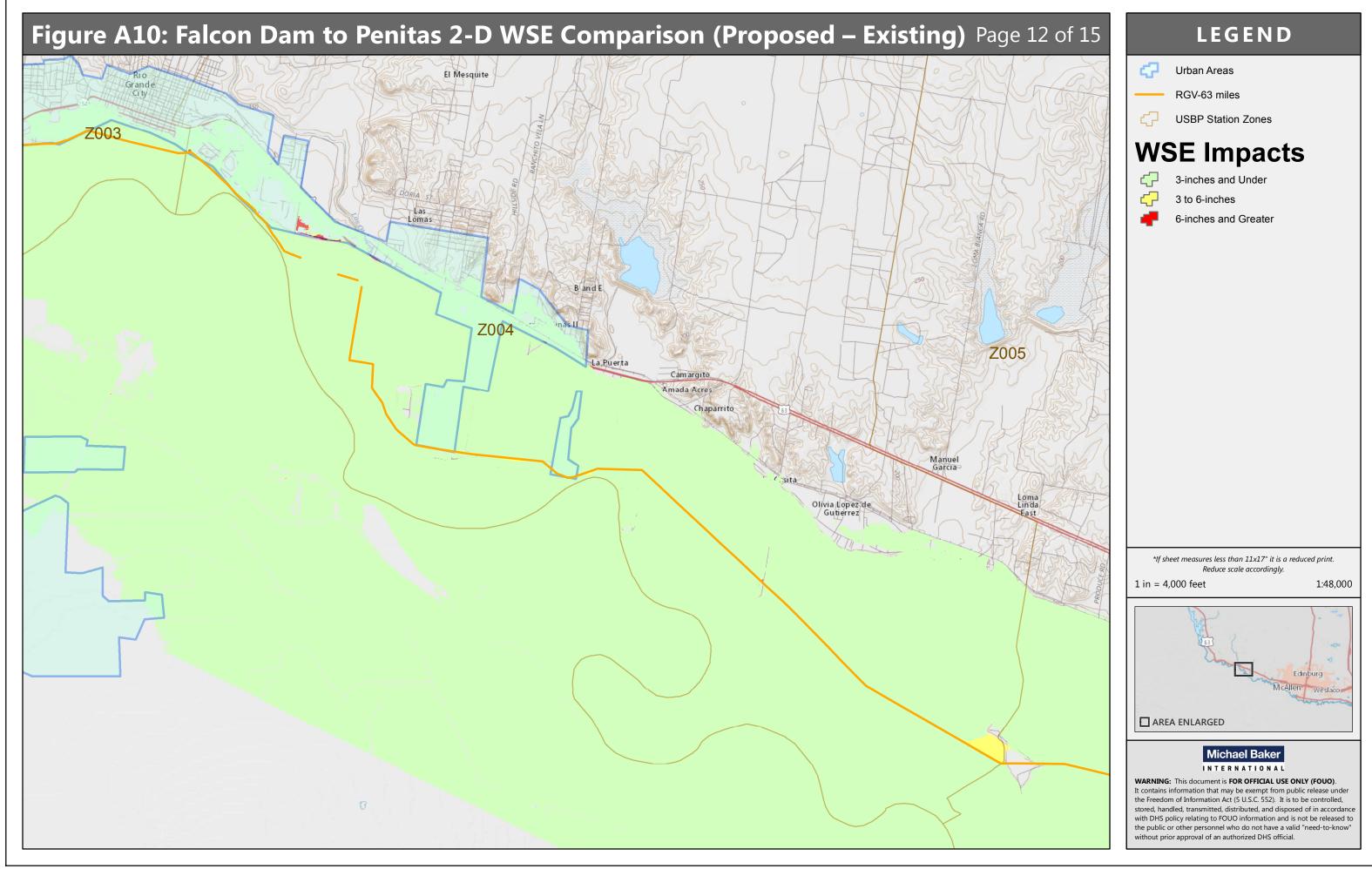


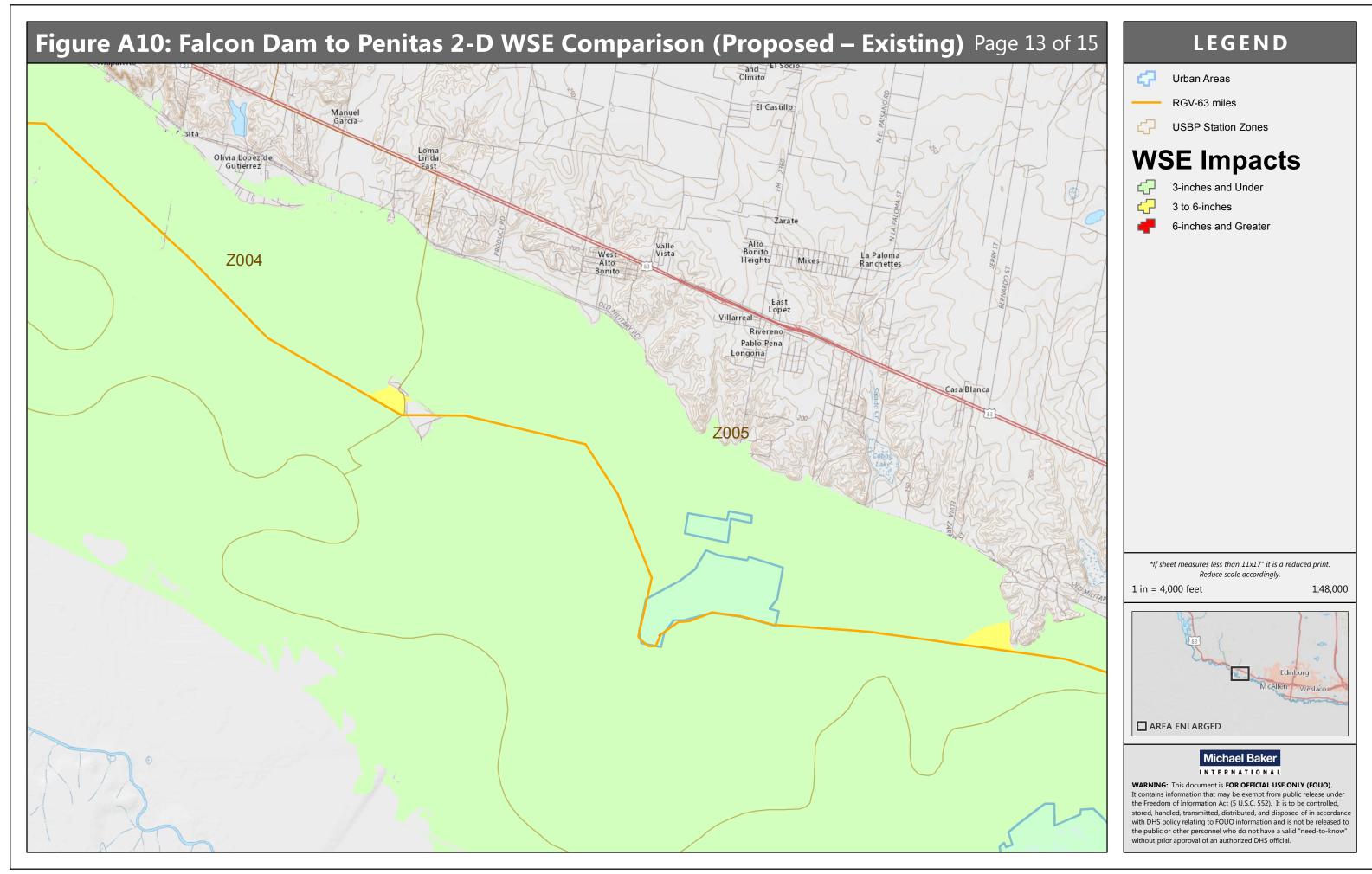


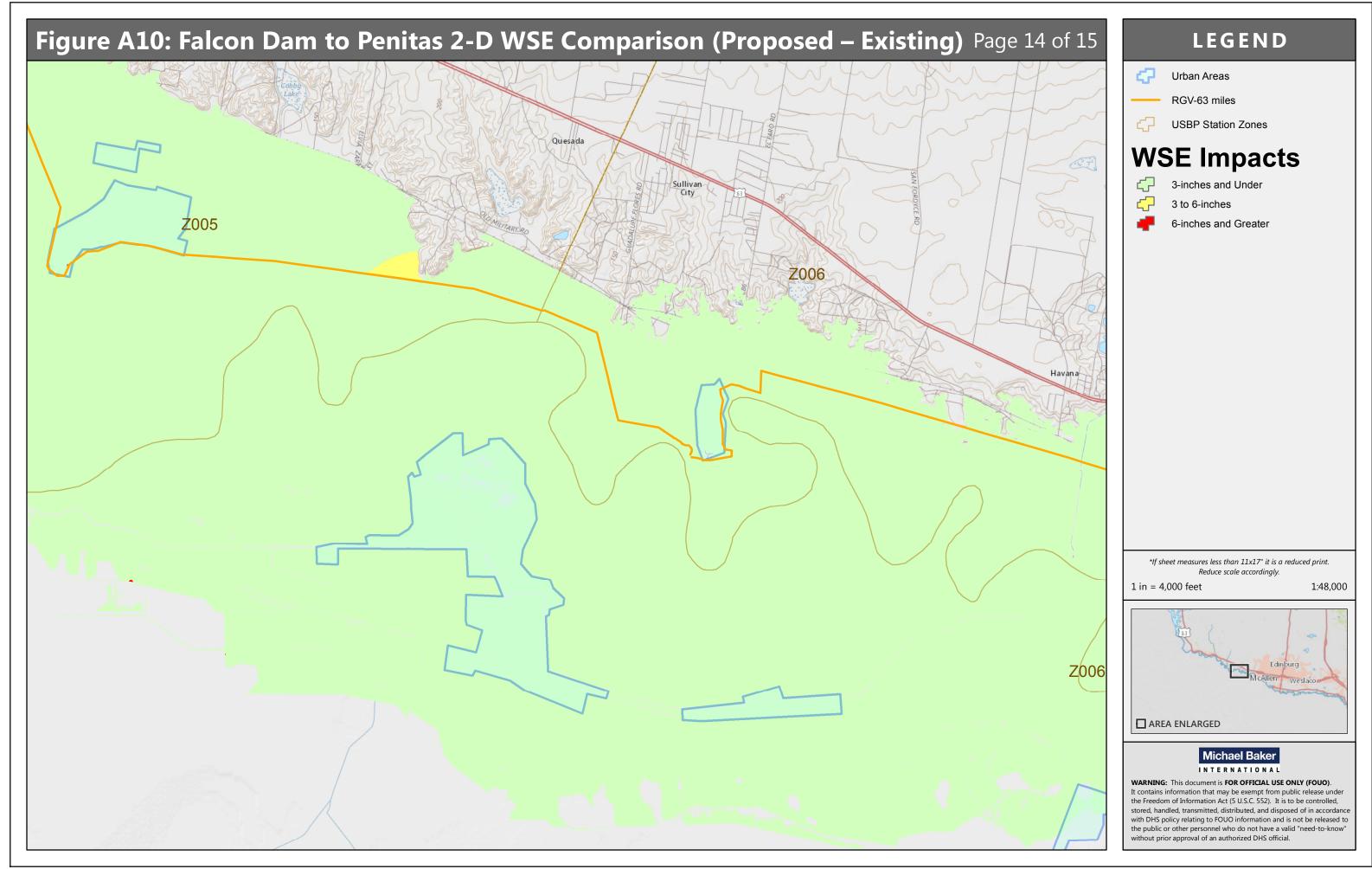


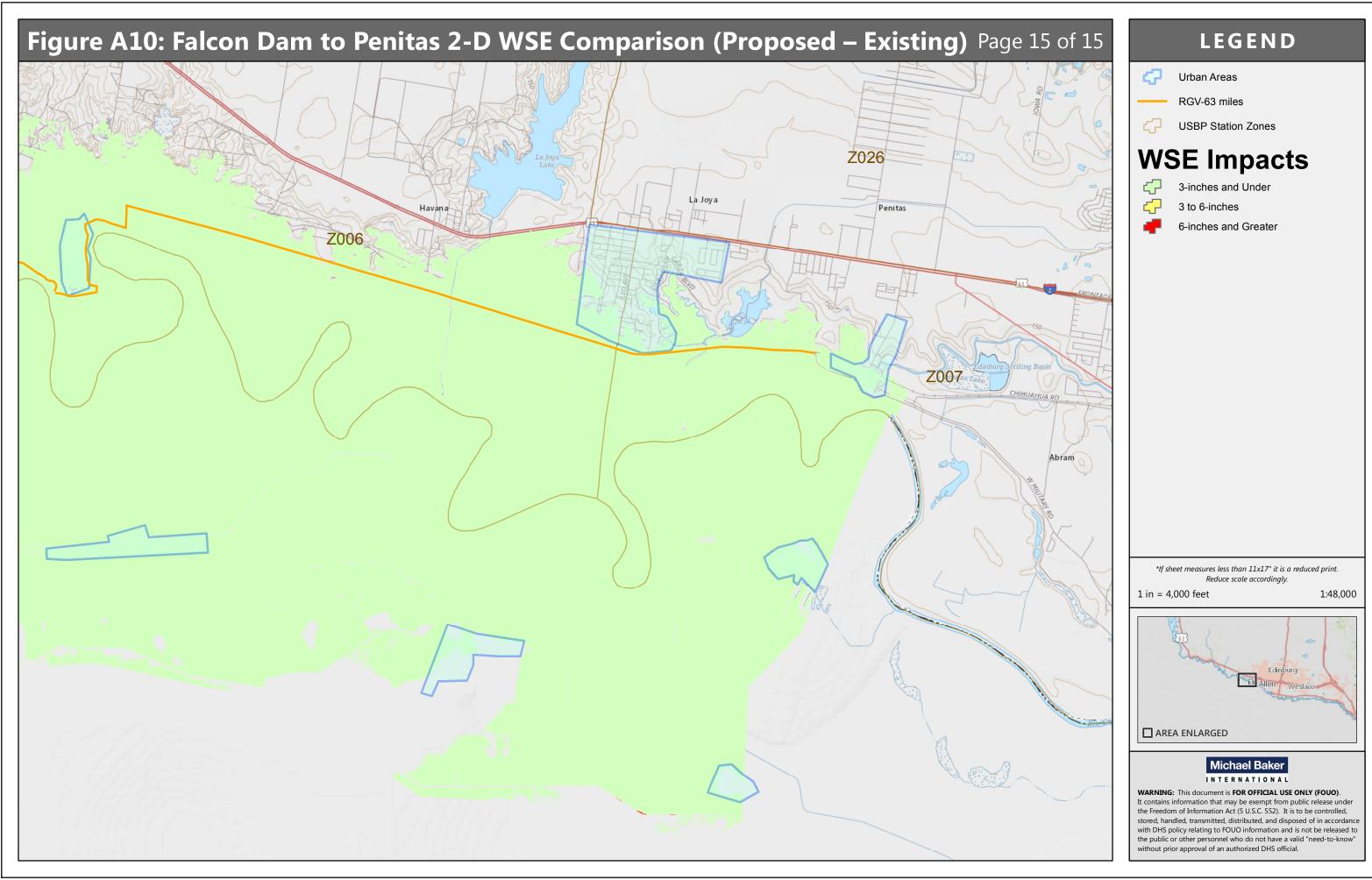














ATTACHMENT B

HYDRAULICS DOCUMENTATION

- > Table B1: Bollard Wall Adjustment Factors Table
- > Penitas to Hidalgo-Cameron County Line Duplicate Effective HEC-RAS Model
- > Penitas to Hidalgo-Cameron County Line Corrected Effective HEC-RAS Model
- ➤ Penitas to Hidalgo-Cameron County Line Proposed HEC-RAS Model
- > Falcon Dam to Penitas 2-D Calibration HEC-RAS Model (Electronic Data)
- > Falcon Dam to Penitas 2-D Existing Conditions HEC-RAS Model (Electronic Data)
- Falcon Dam to Penitas 2-D Proposed Conditions HEC-RAS Model (Electronic Data)

Table B1: Bollard Wall Adjustment Factors

| 20.64.6 | No. Intelligen | Bollard | Weir |
|------------------|----------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV1-01-1 | 9 | Typical | 3.1 |
| FID-RGV1-01-2 | 4 | Typical | 3.1 |
| FID-RGV1-01-3 | 9 | Typical | 3.1 |
| FID-RGV1-01-4 | 9 | Typical | 3.1 |
| FID-RGV1-01-5 | 9 | Typical | 3.1 |
| FID-RGV1-01-6 | 6 | Typical | 3.1 |
| FID-RGV1-01-7 | 9 | Typical | 3.1 |
| FID-RGV1-01-8 | 9 | Typical | 3.1 |
| FID-RGV1-01a-1 | 9 | Typical | 1.0 |
| FID-RGV1-01a-10 | 8 | Typical | 3.1 |
| FID-RGV1-01a-11 | 9 | Typical | 3.1 |
| FID-RGV1-01a-12 | 9 | Typical | 3.1 |
| FID-RGV1-01a-13 | 9 | Typical | 3.1 |
| FID-RGV1-01a-14 | 9 | Typical | 3.1 |
| FID-RGV1-01a-15 | 9 | Typical | 3.1 |
| FID-RGV1-01a-16 | 9 | Typical | 3.1 |
| FID-RGV1-01a-17 | 9 | Typical | 3.1 |
| FID-RGV1-01a-18 | 9 | Typical | 3.1 |
| FID-RGV1-01a-19 | 9 | Typical | 3.1 |
| FID-RGV1-01a-2 | 9 | Typical | 3.1 |
| FID-RGV1-01a-20 | 9 | Typical | 3.1 |
| FID-RGV1-01a-21 | 9 | Typical | 3.1 |
| FID-RGV1-01a-22 | 9 | Typical | 3.1 |
| FID-RGV1-01a-23 | 9 | Typical | 3.1 |
| FID-RGV1-01a-24 | 9 | Typical | 3.1 |
| FID-RGV1-01a-25 | 9 | Typical | 3.1 |
| FID-RGV1-01a-26 | 9 | Typical | 3.1 |
| FID-RGV1-01a-27 | 9 | Typical | 3.1 |
| FID-RGV1-01a-28 | 9 | Typical | 3.1 |
| FID-RGV1-01a-29 | 9 | Typical | 3.1 |
| FID-RGV1-01a-3 | 9 | Typical | 1.0 |
| FID-RGV1-01a-30 | 9 | Typical | 3.1 |
| FID-RGV1-01a-31 | 9 | Typical | 3.1 |
| FID-RGV1-01a-32 | 9 | Typical | 3.1 |
| FID-RGV1-01a-33 | 9 | Typical | 3.1 |
| FID-RGV1-01a-34 | 9 | Typical | 3.1 |
| FID-RGV1-01a-35 | 9 | Typical | 3.1 |
| FID-RGV1-01a-36 | 9 | Typical | 3.1 |
| FID-RGV1-01a-37 | 9 | Typical | 3.1 |
| FID-RGV1-01a-38 | 9 | Typical | 3.1 |
| FID-RGV1-01a-39 | 9 | Typical | 3.1 |
| FID-RGV1-01a-4 | 9 | Typical | 3.1 |
| FID-RGV1-01a-40 | 9 | Typical | 3.1 |
| FID-RGV1-01a-41 | 9 | Typical | 3.1 |
| FID-RGV1-01a-42 | 9 | Typical | 3.1 |

Table B1: Bollard Wall Adjustment Factors

| 2D CA Couraction | No. de la la ca | Bollard | Weir |
|------------------|-----------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV1-01a-43 | 9 | Typical | 3.1 |
| FID-RGV1-01a-44 | 9 | Gap | 3.1 |
| FID-RGV1-01a-45 | 9 | Typical | 1.0 |
| FID-RGV1-01a-46 | 9 | Typical | 1.0 |
| FID-RGV1-01a-47 | 9 | Typical | 1.0 |
| FID-RGV1-01a-48 | 9 | Typical | 1.0 |
| FID-RGV1-01a-49 | 9 | Typical | 3.1 |
| FID-RGV1-01a-5 | 9 | Typical | 3.1 |
| FID-RGV1-01a-6 | 9 | Typical | 3.1 |
| FID-RGV1-01a-7 | 9 | Typical | 3.1 |
| FID-RGV1-01a-8 | 9 | Typical | 3.1 |
| FID-RGV1-01a-9 | 9 | Typical | 3.1 |
| FID-RGV1-01b-1 | 9 | Typical | 3.1 |
| FID-RGV1-01b-2 | 9 | Typical | 3.1 |
| FID-RGV1-01b-3 | 9 | Typical | 3.1 |
| FID-RGV1-01b-4 | 9 | Typical | 1.0 |
| FID-RGV1-01b-5 | 9 | Typical | 3.1 |
| FID-RGV1-01c-1 | 9 | Typical | 3.1 |
| FID-RGV1-01c-10 | 9 | Typical | 3.1 |
| FID-RGV1-01c-11 | 9 | Typical | 3.1 |
| FID-RGV1-01c-12 | 9 | Typical | 1.0 |
| FID-RGV1-01c-13 | 9 | Typical | 1.0 |
| FID-RGV1-01c-14 | 9 | Typical | 1.0 |
| FID-RGV1-01c-15 | 9 | Typical | 1.0 |
| FID-RGV1-01c-16 | 9 | Typical | 3.1 |
| FID-RGV1-01c-17 | 9 | Typical | 3.1 |
| FID-RGV1-01c-18 | 9 | Typical | 3.1 |
| FID-RGV1-01c-19 | 9 | Typical | 3.1 |
| FID-RGV1-01c-2 | 9 | Typical | 3.1 |
| FID-RGV1-01c-3 | 9 | Typical | 3.1 |
| FID-RGV1-01c-4 | 9 | Typical | 3.1 |
| FID-RGV1-01c-5 | 9 | Typical | 3.1 |
| FID-RGV1-01c-6 | 9 | Typical | 3.1 |
| FID-RGV1-01c-7 | 9 | Typical | 3.1 |
| FID-RGV1-01c-8 | - | Fully Blocked | 3.1 |
| FID-RGV1-01c-9 | 9 | Typical | 3.1 |
| FID-RGV1-02-1 | 8 | Typical | 3.1 |
| FID-RGV1-02-2 | 8 | Typical | 3.1 |
| FID-RGV1-02-3 | 8 | Typical | 3.1 |
| FID-RGV1-02-4 | 8 | Typical | 3.1 |
| FID-RGV1-03-1 | 8 | Typical | 3.1 |
| FID-RGV1-03-2 | 8 | Typical | 1.0 |
| FID-RGV1-03-3 | 8 | Typical | 3.1 |
| FID-RGV2-01-1 | 9 | Typical | 1.0 |
| FID-RGV2-01-2 | - | Fully Blocked | 1.0 |

Table B1: Bollard Wall Adjustment Factors

| | | Bollard | Weir |
|------------------|------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV2-01-3 | - | Fully Blocked | 1.0 |
| FID-RGV2-02-1 | 24 | Rotated | 1.0 |
| FID-RGV2-03-1 | 24 | Rotated | 1.0 |
| FID-RGV2-03-2 | 8 | Typical | 1.0 |
| FID-RGV2-03-3 | 20 | Typical, Gap | 3.1 |
| FID-RGV2-03-4 | 8 | Typical | 3.1 |
| FID-RGV2-03-5 | 8 | Typical | 3.1 |
| FID-RGV2-03-6 | 8 | Typical | 3.1 |
| FID-RGV2-03-7 | 20 | Typical | 1.0 |
| FID-RGV2-04-1 | 20 | Typical, Gap | 1.0 |
| FID-RGV2-04-10 | 9 | Typical | 1.0 |
| FID-RGV2-04-11 | 9 | Typical | 1.0 |
| FID-RGV2-04-12 | 9 | Typical | 1.0 |
| FID-RGV2-04-13 | 9 | Typical | 1.0 |
| FID-RGV2-04-14 | 9 | Typical | 1.0 |
| FID-RGV2-04-2 | 9 | Typical | 1.0 |
| FID-RGV2-04-3 | 9 | Typical | 1.0 |
| FID-RGV2-04-4 | 9 | Typical | 1.0 |
| FID-RGV2-04-5 | 9 | Typical | 1.0 |
| FID-RGV2-04-6 | 9 | Typical | 1.0 |
| FID-RGV2-04-7 | 9 | Typical | 1.0 |
| FID-RGV2-04-8 | 9 | Typical | 1.0 |
| FID-RGV2-04-9 | 9 | Typical | 1.0 |
| FID-RGV3-01-1 | 20 | Typical | 1.0 |
| FID-RGV3-01-10 | 8 | Typical | 3.1 |
| FID-RGV3-01-11 | 8 | Typical | 3.1 |
| FID-RGV3-01-12 | 8 | Typical | 3.1 |
| FID-RGV3-01-13 | 8 | Typical | 1.0 |
| FID-RGV3-01-14 | 8 | Typical | 3.1 |
| FID-RGV3-01-15 | 20 | Rotated | 1.0 |
| FID-RGV3-01-16 | 20 | Rotated, Gap | 1.0 |
| FID-RGV3-01-17 | 8 | Typical | 1.0 |
| FID-RGV3-01-18 | 8 | Typical | 1.0 |
| FID-RGV3-01-19 | 8 | Typical | 1.0 |
| FID-RGV3-01-2 | 8 | Typical | 1.0 |
| FID-RGV3-01-20 | 8 | Typical | 3.1 |
| FID-RGV3-01-21 | 8 | Typical | 1.0 |
| FID-RGV3-01-22 | 8 | Typical | 1.0 |
| FID-RGV3-01-23 | 8 | Typical | 1.0 |
| FID-RGV3-01-24 | 8 | Typical | 1.0 |
| FID-RGV3-01-25 | 8 | Typical | 1.0 |
| FID-RGV3-01-26 | 8 | Typical | 1.0 |
| FID-RGV3-01-27 | 8 | Typical | 1.0 |
| FID-RGV3-01-28 | 8 | Typical | 1.0 |
| FID-RGV3-01-29 | 8 | Typical | 1.0 |

Table B1: Bollard Wall Adjustment Factors

| 2D SA Connection | Multiplier | Bollard | Weir |
|----------------------------------|---------------|--------------------|-------------|
| 2D 3A Connection | Multiplier | Configuration | Coefficient |
| FID-RGV3-01-3 | 8 | Typical | 1.0 |
| FID-RGV3-01-30 | 8 | Typical | 1.0 |
| FID-RGV3-01-31 | 8 | Typical | 1.0 |
| FID-RGV3-01-32 | 8 | Typical | 1.0 |
| FID-RGV3-01-33 | 8 | Typical | 1.0 |
| FID-RGV3-01-34 | 8 | Typical | 1.0 |
| FID-RGV3-01-35 | 8 | Typical | 1.0 |
| FID-RGV3-01-36
FID-RGV3-01-37 | <u>8</u>
8 | Typical
Typical | 1.0
1.0 |
| FID-RGV3-01-37 | 8 | Typical | 1.0 |
| FID-RGV3-01-39 | 8 | Typical | 1.0 |
| FID-RGV3-01-4 | 8 | Typical | 3.1 |
| FID-RGV3-01-40 | 8 | Typical | 1.0 |
| FID-RGV3-01-41 | 8 | Typical | 1.0 |
| FID-RGV3-01-42 | 8 | Typical | 1.0 |
| FID-RGV3-01-43 | 8 | Typical | 1.0 |
| FID-RGV3-01-44 | 8 | Typical | 1.0 |
| FID-RGV3-01-45 | 8 | Typical | 1.0 |
| FID-RGV3-01-46 | 8 | Typical | 1.0 |
| FID-RGV3-01-47 | 8 | Typical | 1.0 |
| FID-RGV3-01-48 | 8 | Typical | 1.0 |
| FID-RGV3-01-5 | 8 | Typical | 3.1 |
| FID-RGV3-01-6 | 8 | Typical | 1.0 |
| FID-RGV3-01-7 | 8 | Typical | 1.0 |
| FID-RGV3-01-8 | 8 | Typical | 1.0 |
| FID-RGV3-01-9 | 8 | Typical | 1.0 |
| FID-RGV3-02-1 | 8 | Typical | 1.0 |
| FID-RGV3-02-10 | 8 | Typical | 3.1 |
| FID-RGV3-02-11 | 8 | Typical | 3.1 |
| FID-RGV3-02-12 | 8 | Typical | 3.1 |
| FID-RGV3-02-2
FID-RGV3-02-3 | 8
8 | Typical
Typical | 1.0
1.0 |
| FID-RGV3-02-3 | 8 | Typical | 1.0 |
| FID-RGV3-02-5 | 8 | Typical | 1.0 |
| FID-RGV3-02-6 | 8 | Typical | 1.0 |
| FID-RGV3-02-7 | 8 | Typical | 1.0 |
| FID-RGV3-02-8 | 8 | Typical | 1.0 |
| FID-RGV3-02-9 | 8 | Typical | 3.1 |
| FID-RGV4-01-1 | 9 | Typical | 1.0 |
| FID-RGV4-01-2 | 9 | Typical | 1.0 |
| FID-RGV4-01-3 | 20 | Typical | 1.0 |
| FID-RGV4-01-4 | 20 | Typical, Gap | 1.0 |
| FID-RGV4-01-5 | 20 | Typical | 1.0 |
| FID-RGV4-01-6 | 20 | Rotated | 1.0 |
| FID-RGV4-01-7 | 9 | Typical | 1.0 |

Table B1: Bollard Wall Adjustment Factors

| 20.04.0 | na litalia. | Bollard | Weir |
|------------------|-------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV4-02-1 | 20 | Rotated | 3.1 |
| FID-RGV4-03-1 | 20 | Rotated | 3.1 |
| FID-RGV4-03-10 | 20 | Rotated | 3.1 |
| FID-RGV4-03-11 | 20 | Rotated | 3.1 |
| FID-RGV4-03-12 | 20 | Rotated | 3.1 |
| FID-RGV4-03-13 | 20 | Rotated, Gap | 2.6 |
| FID-RGV4-03-14 | - | Gap | 2.6 |
| FID-RGV4-03-15 | 20 | Rotated, Gap | 1.0 |
| FID-RGV4-03-16 | 20 | Rotated | 1.0 |
| FID-RGV4-03-2 | 20 | Rotated | 3.1 |
| FID-RGV4-03-3 | 21 | Rotated | 3.1 |
| FID-RGV4-03-4 | 22 | Rotated | 3.1 |
| FID-RGV4-03-5 | 23 | Rotated | 3.1 |
| FID-RGV4-03-6 | 24 | Rotated | 1.0 |
| FID-RGV4-03-7 | 25 | Rotated | 3.1 |
| FID-RGV4-03-8 | 26 | Rotated | 3.1 |
| FID-RGV4-03-9 | 27 | Rotated | 1.0 |
| FID-RGV4-04-1 | 28 | Rotated | 1.0 |
| FID-RGV4-04-10 | 8 | Typical | 3.1 |
| FID-RGV4-04-11 | 8 | Typical | 3.1 |
| FID-RGV4-04-12 | 8 | Typical, Gap | 3.1 |
| FID-RGV4-04-13 | 8 | Typical | 3.1 |
| FID-RGV4-04-14 | 8 | Typical | 3.1 |
| FID-RGV4-04-15 | 8 | Typical | 3.1 |
| FID-RGV4-04-16 | 8 | Typical | 3.1 |
| FID-RGV4-04-17 | 8 | Typical | 3.1 |
| FID-RGV4-04-18 | 8 | Typical | 3.1 |
| FID-RGV4-04-19 | 8 | Typical | 3.1 |
| FID-RGV4-04-2 | 20 | Rotated | 1.0 |
| FID-RGV4-04-20 | 8 | Typical | 3.1 |
| FID-RGV4-04-21 | 8 | Typical | 3.1 |
| FID-RGV4-04-22 | 8 | Typical | 3.1 |
| FID-RGV4-04-23 | 8 | Typical | 3.1 |
| FID-RGV4-04-24 | 8 | Typical | 1.0 |
| FID-RGV4-04-25 | 8 | Typical | 1.0 |
| FID-RGV4-04-26 | 8 | Typical, Gap | 1.0 |
| FID-RGV4-04-3 | 20 | Typical | 3.1 |
| FID-RGV4-04-4 | 8 | Typical | 3.1 |
| FID-RGV4-04-5 | 8 | Typical | 3.1 |
| FID-RGV4-04-6 | 8 | Typical | 3.1 |
| FID-RGV4-04-7 | 8 | Typical | 3.1 |
| FID-RGV4-04-8 | 8 | Typical | 3.1 |
| FID-RGV4-04-9 | 8 | Typical | 3.1 |
| FID-RGV5-01-1 | 8 | Typical | 1.0 |
| FID-RGV5-01-10 | 8 | Typical | 3.1 |

Table B1: Bollard Wall Adjustment Factors

| 2D CA Connection | D.O. Itialian | Bollard | Weir |
|------------------|---------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV5-01-11 | 8 | Typical | 3.1 |
| FID-RGV5-01-12 | 8 | Typical | 3.1 |
| FID-RGV5-01-13 | 8 | Typical | 3.1 |
| FID-RGV5-01-14 | 8 | Typical | 3.1 |
| FID-RGV5-01-15 | 8 | Typical | 3.1 |
| FID-RGV5-01-16 | 8 | Typical | 1.0 |
| FID-RGV5-01-17 | 8 | Typical | 3.1 |
| FID-RGV5-01-18 | 8 | Typical | 1.0 |
| FID-RGV5-01-19 | 8 | Typical | 1.0 |
| FID-RGV5-01-2 | 8 | Typical | 3.1 |
| FID-RGV5-01-20 | 8 | Typical | 3.1 |
| FID-RGV5-01-21 | 8 | Typical | 1.0 |
| FID-RGV5-01-22 | 8 | Typical | 1.0 |
| FID-RGV5-01-23 | 8 | Typical | 1.0 |
| FID-RGV5-01-24 | 8 | Typical | 1.0 |
| FID-RGV5-01-25 | 8 | Typical | 1.0 |
| FID-RGV5-01-26 | 8 | Typical | 1.0 |
| FID-RGV5-01-27 | 8 | Typical | 1.0 |
| FID-RGV5-01-28 | 8 | Typical | 3.1 |
| FID-RGV5-01-29 | 8 | Typical | 3.1 |
| FID-RGV5-01-3 | 8 | Typical | 3.1 |
| FID-RGV5-01-30 | 8 | Typical, Gap | 3.1 |
| FID-RGV5-01-31 | 8 | Typical | 3.1 |
| FID-RGV5-01-32 | 8 | Typical | 3.1 |
| FID-RGV5-01-33 | 8 | Typical | 3.1 |
| FID-RGV5-01-34 | 8 | Typical | 3.1 |
| FID-RGV5-01-35 | 24 | Rotated | 3.1 |
| FID-RGV5-01-36 | 24 | Rotated | 3.1 |
| FID-RGV5-01-37 | - | Gap | 1.0 |
| FID-RGV5-01-38 | - | Gap | 1.0 |
| FID-RGV5-01-39 | 8 | Typical | 3.1 |
| FID-RGV5-01-4 | 8 | Typical | 3.1 |
| FID-RGV5-01-40 | 8 | Typical | 3.1 |
| FID-RGV5-01-41 | 8 | Typical | 3.1 |
| FID-RGV5-01-42 | 8 | Typical | 3.1 |
| FID-RGV5-01-43 | 8 | Typical, Gap | 3.1 |
| FID-RGV5-01-44 | 8 | Typical | 3.1 |
| FID-RGV5-01-5 | 8 | Typical | 3.1 |
| FID-RGV5-01-6 | 8 | Typical | 3.1 |
| FID-RGV5-01-7 | 8 | Typical | 3.1 |
| FID-RGV5-01-8 | 8 | Typical | 3.1 |
| FID-RGV5-01-9 | 8 | Typical | 3.1 |
| FID-RGV6-01-1 | 8 | Typical | 3.1 |
| FID-RGV6-01-10 | 50 | Typical | 1.0 |
| FID-RGV6-01-2 | 8 | Typical | 1.0 |

Table B1: Bollard Wall Adjustment Factors

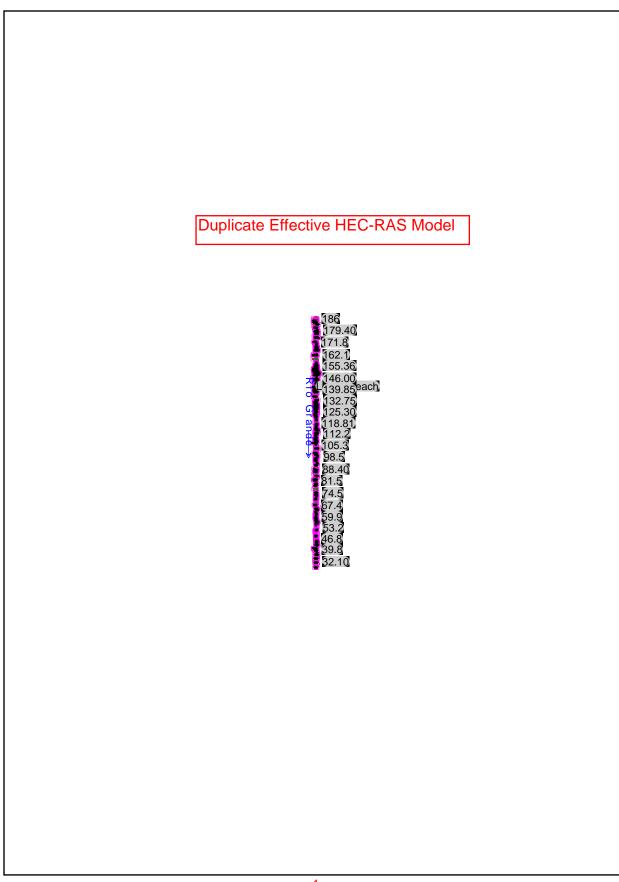
| | | Bollard | Weir |
|------------------|------------|---------------|-------------|
| 2D SA Connection | Multiplier | Configuration | Coefficient |
| FID-RGV6-01-3 | 8 | Typical | 3.1 |
| FID-RGV6-01-4 | 8 | Typical | 3.1 |
| FID-RGV6-01-5 | 8 | Typical | 3.1 |
| FID-RGV6-01-6 | 8 | Typical | 3.1 |
| FID-RGV6-01-7 | 8 | Typical | 3.1 |
| FID-RGV6-01-8 | 8 | Typical | 3.1 |
| FID-RGV6-01-9 | 8 | Typical | 3.1 |
| FID-RGV6-02-1 | - | Fully Blocked | 1.0 |
| FID-RGV6-03-1 | 9 | Typical | 3.1 |
| FID-RGV6-03-2 | 9 | Typical | 3.1 |
| FID-RGV6-03-3 | 9 | Typical | 3.1 |
| FID-RGV6-03-4 | | Gap | 1.0 |
| FID-RGV6-03-5 | 20 | Typical | 1.0 |
| FID-RGV6-03-6 | 9 | Typical | 3.1 |
| FID-RGV6-03-7 | - | Fully Blocked | 1.0 |
| FID-RGV6-04-1 | 8 | Typical | 3.1 |
| FID-RGV6-04-10 | 8 | Typical | 3.1 |
| FID-RGV6-04-11 | 8 | Typical | 3.1 |
| FID-RGV6-04-12 | 8 | Typical | 3.1 |
| FID-RGV6-04-13 | 8 | Typical | 3.1 |
| FID-RGV6-04-14 | 8 | Typical | 3.1 |
| FID-RGV6-04-15 | 8 | Typical | 3.1 |
| FID-RGV6-04-16 | 8 | Typical | 3.1 |
| FID-RGV6-04-17 | 8 | Typical, Gap | 3.1 |
| FID-RGV6-04-18 | 8 | Typical | 3.1 |
| FID-RGV6-04-19 | 8 | Typical | 3.1 |
| FID-RGV6-04-2 | 8 | Typical | 3.1 |
| FID-RGV6-04-20 | 8 | Typical | 3.1 |
| FID-RGV6-04-21 | 8 | Typical | 3.1 |
| FID-RGV6-04-22 | 8 | Typical | 3.1 |
| FID-RGV6-04-23 | 8 | Typical | 3.1 |
| FID-RGV6-04-24 | 8 | Typical | 3.1 |
| FID-RGV6-04-25 | 8 | Typical | 3.1 |
| FID-RGV6-04-3 | 8 | Typical | 3.1 |
| FID-RGV6-04-4 | 8 | Typical | 3.1 |
| FID-RGV6-04-5 | 8 | Typical | 3.1 |
| FID-RGV6-04-6 | 8 | Typical | 3.1 |
| FID-RGV6-04-7 | 8 | Typical | 3.1 |
| FID-RGV6-04-8 | 8 | Typical | 3.1 |
| FID-RGV6-04-9 | 8 | Typical | 3.1 |
| FID-RGV7-01-1 | 9 | Typical | 3.1 |
| FID-RGV7-01-2 | 9 | Typical | 3.1 |
| FID-RGV7-01-3 | 9 | Typical | 3.1 |
| FID-RGV7-01-4 | 9 | Typical | 3.1 |
| FID-RGV7-01-5 | 9 | Typical | 3.1 |

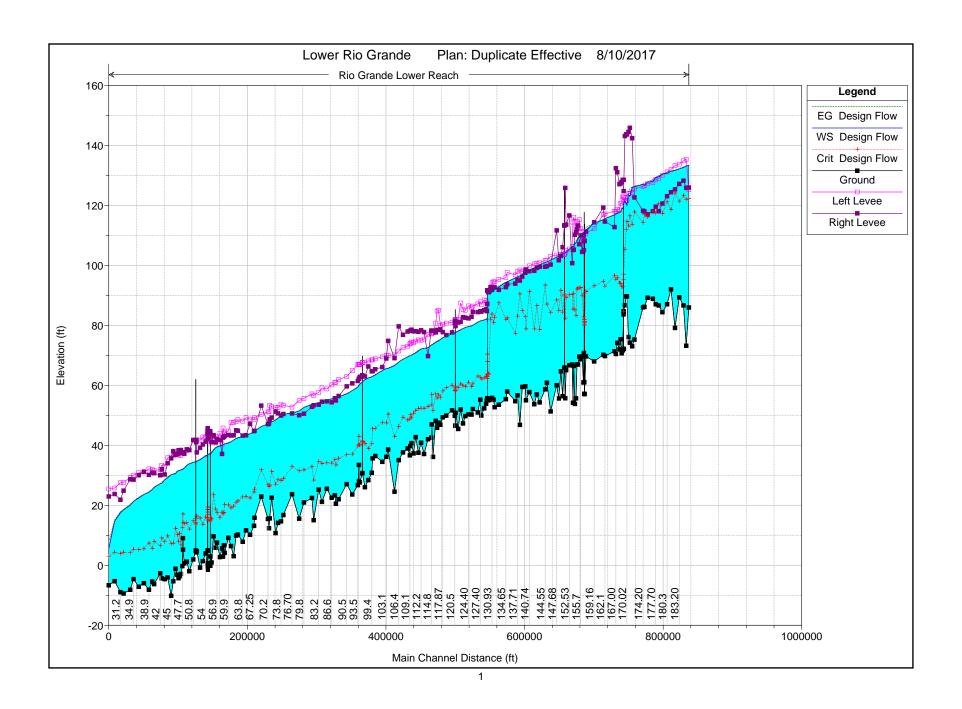
Table B1: Bollard Wall Adjustment Factors

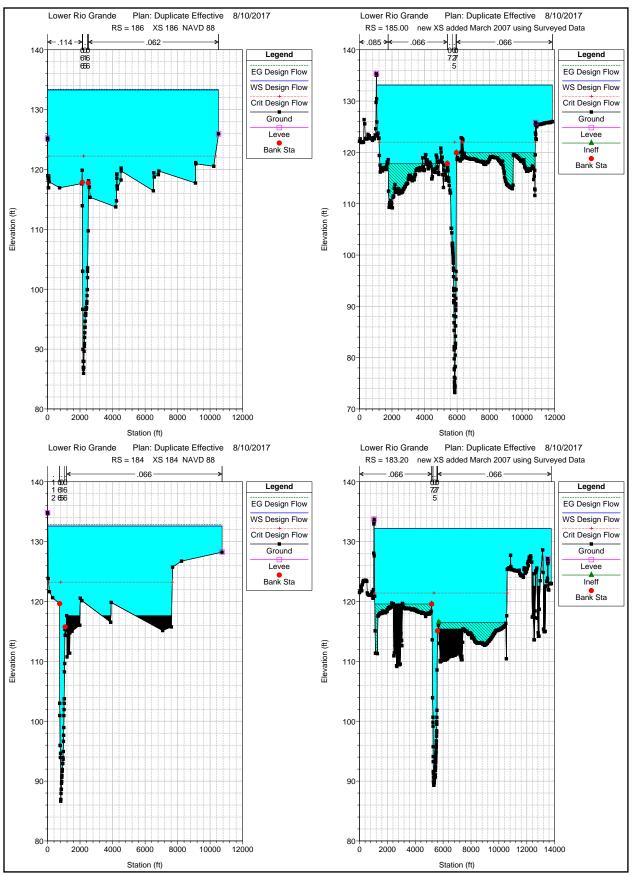
| 2D SA Connection | Multiplier | Bollard | Weir |
|------------------|------------|---------------|-------------|
| 2D 3A Connection | Multiplier | Configuration | Coefficient |
| FID-RGV7-01-6 | 9 | Typical | 3.1 |
| FID-RGV7-01-7 | 9 | Typical | 3.1 |
| FID-RGV7-01-8 | 9 | Typical | 3.1 |
| FID-RGV7-01-9 | 9 | Typical | 3.1 |

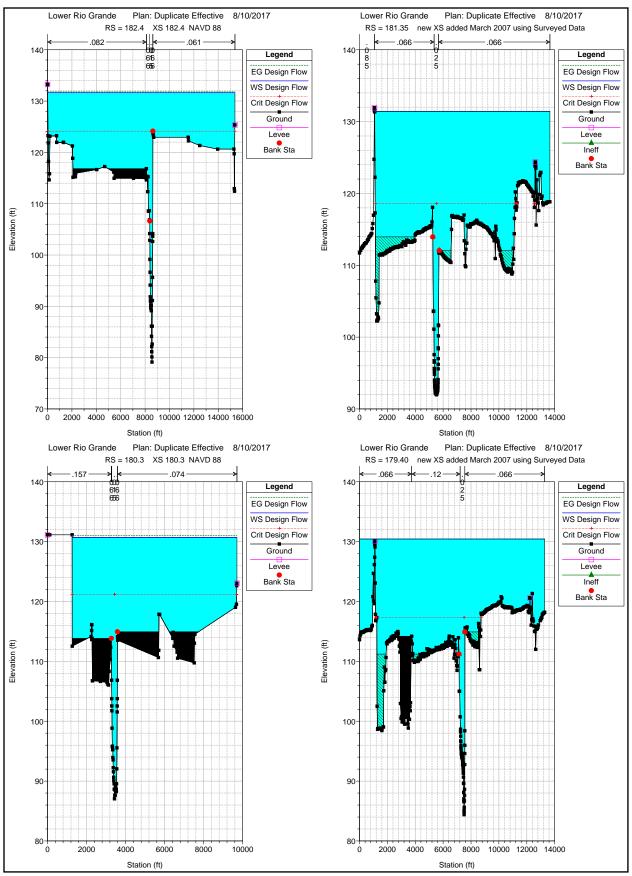


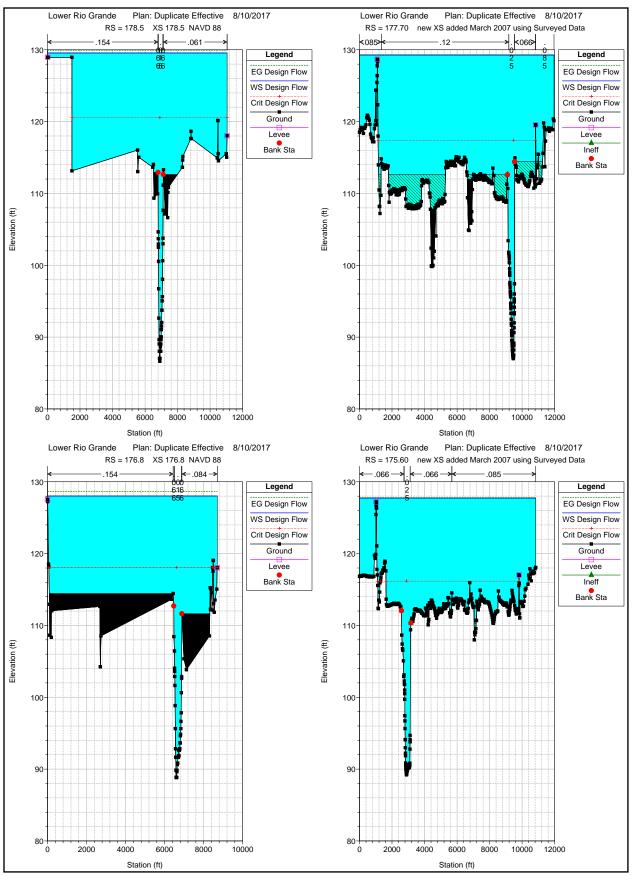
| Penitas to Hidalgo-Cameron County Line Duplicate Effective HEC-RAS Model |
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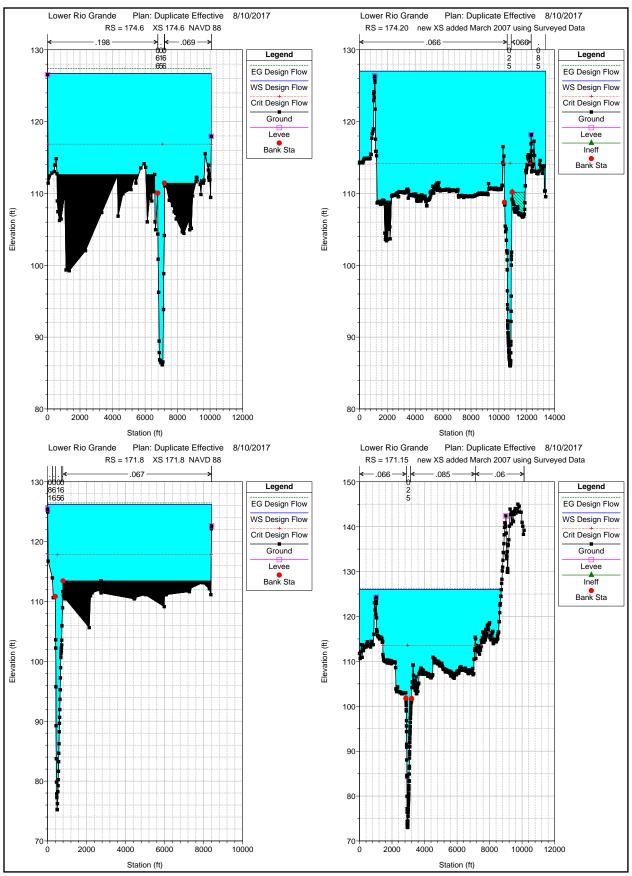


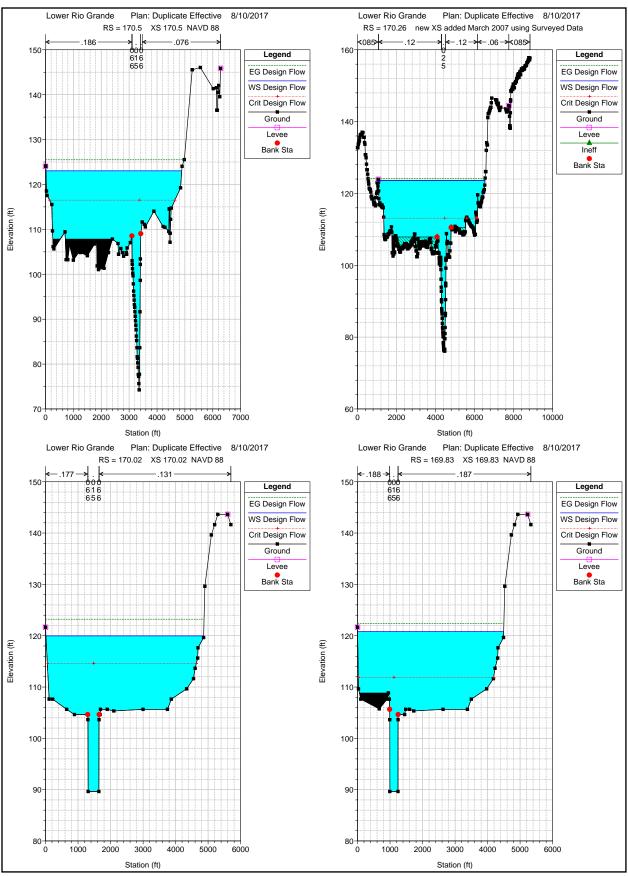


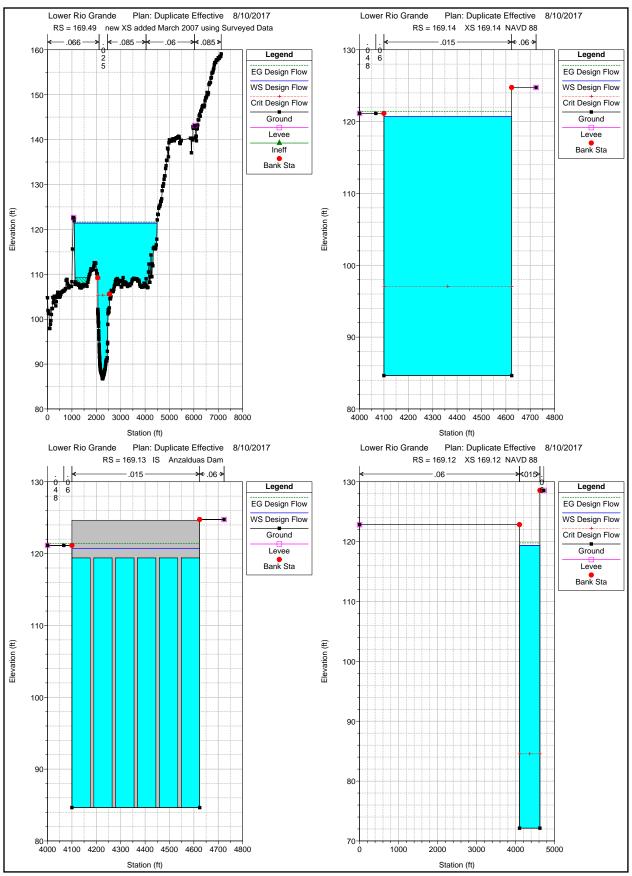


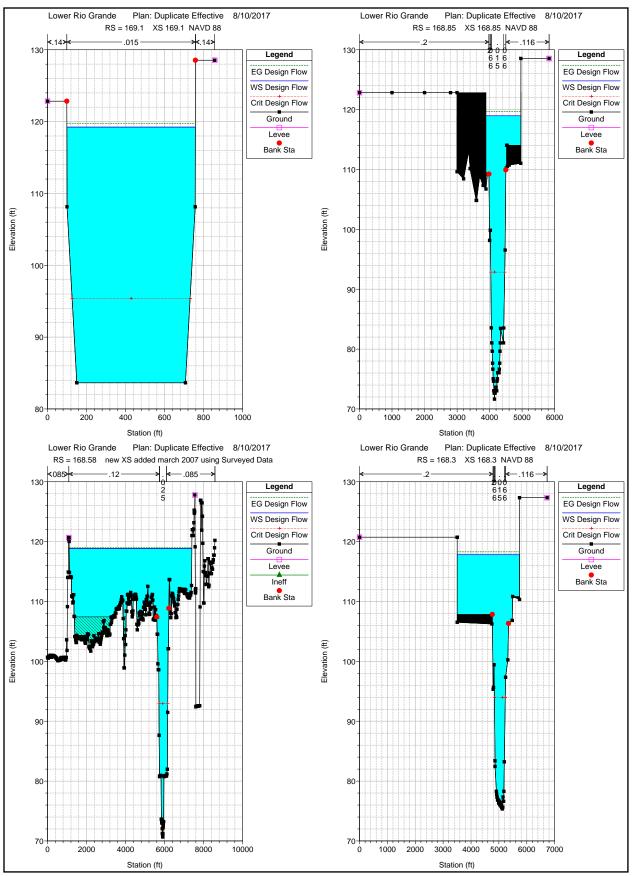


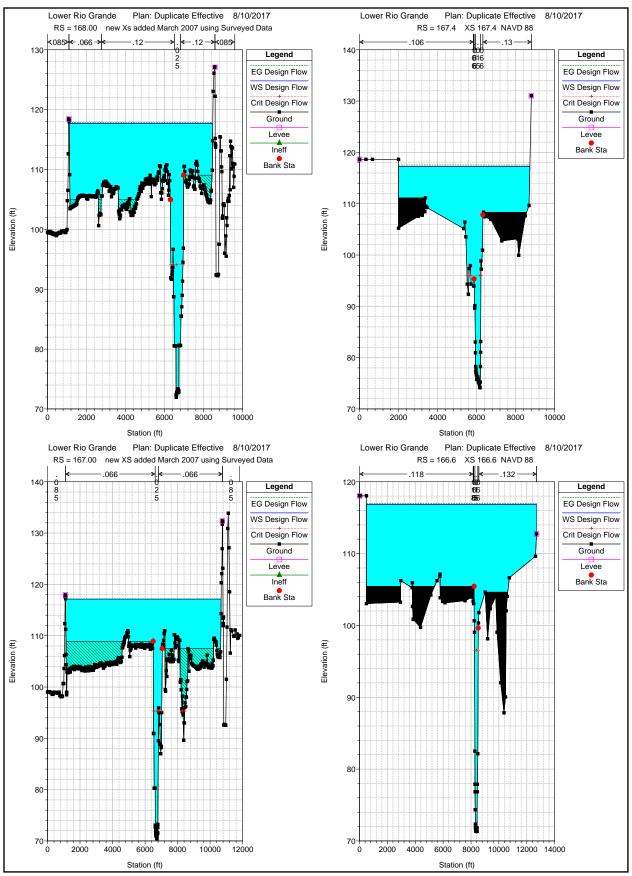


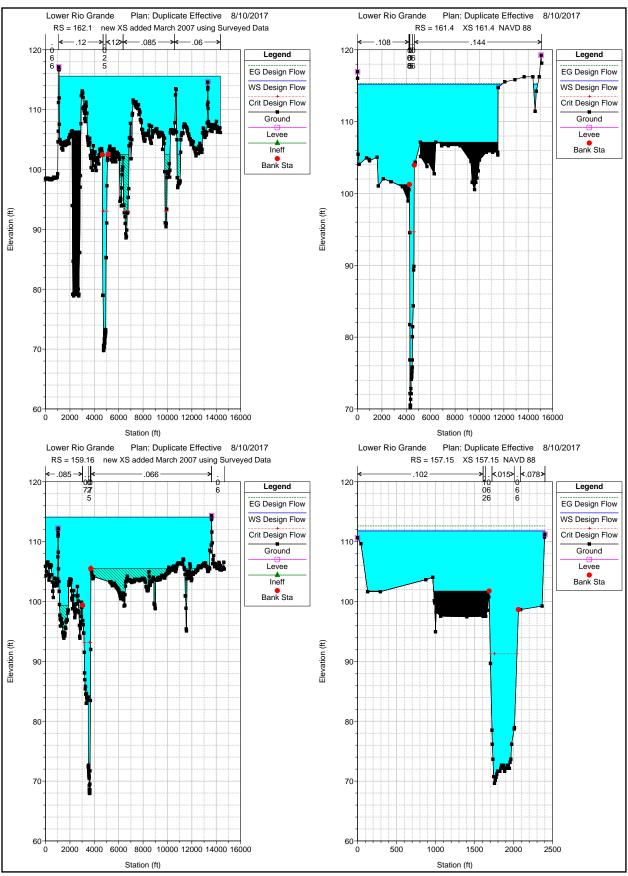


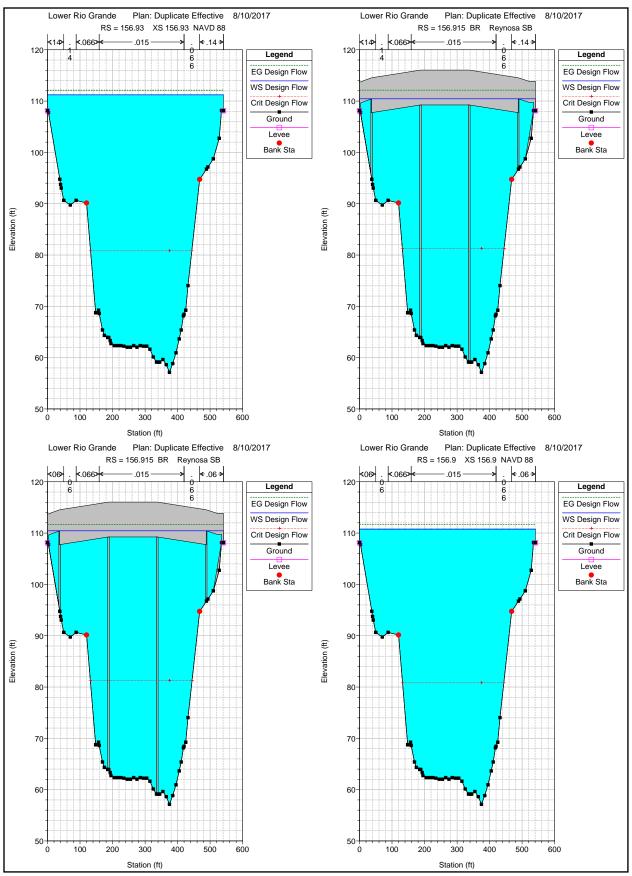


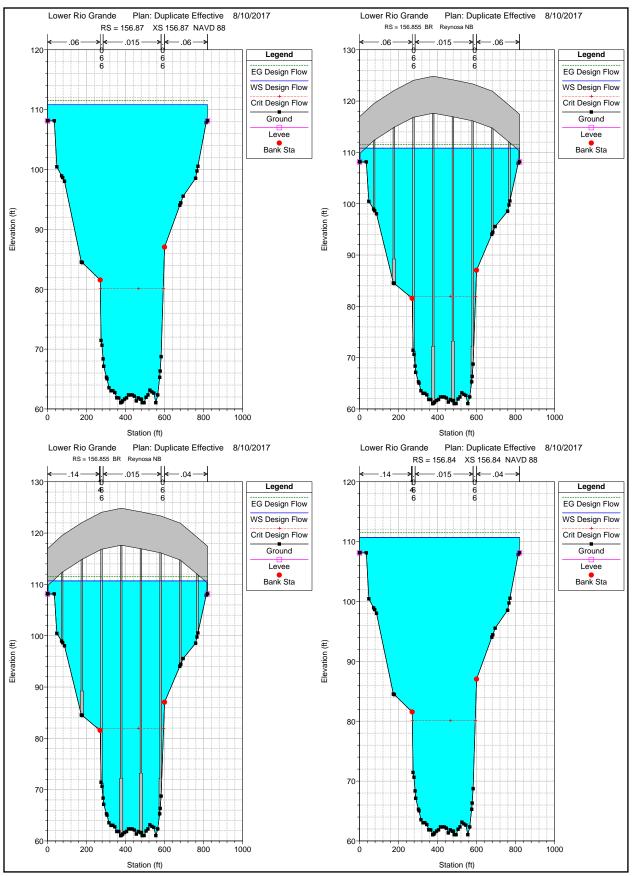


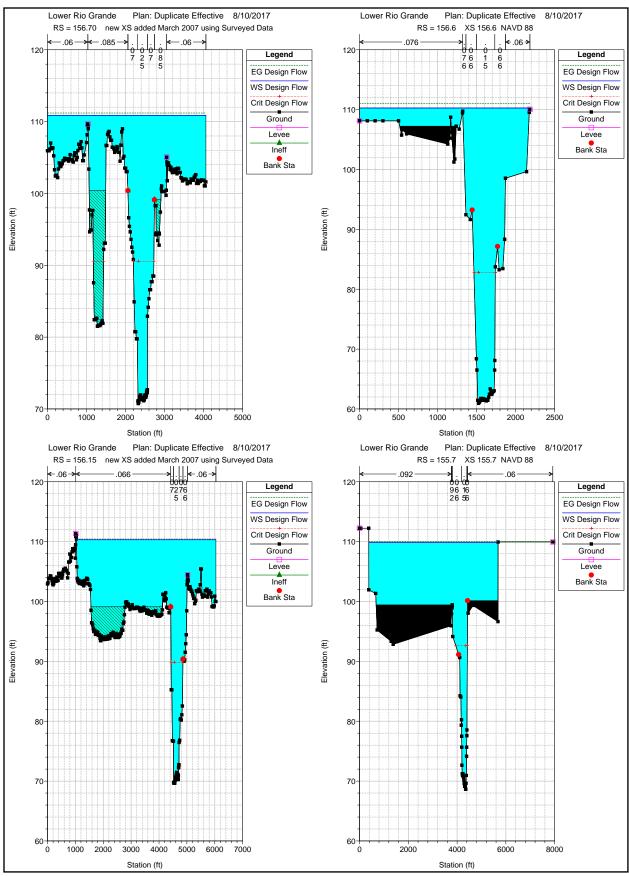


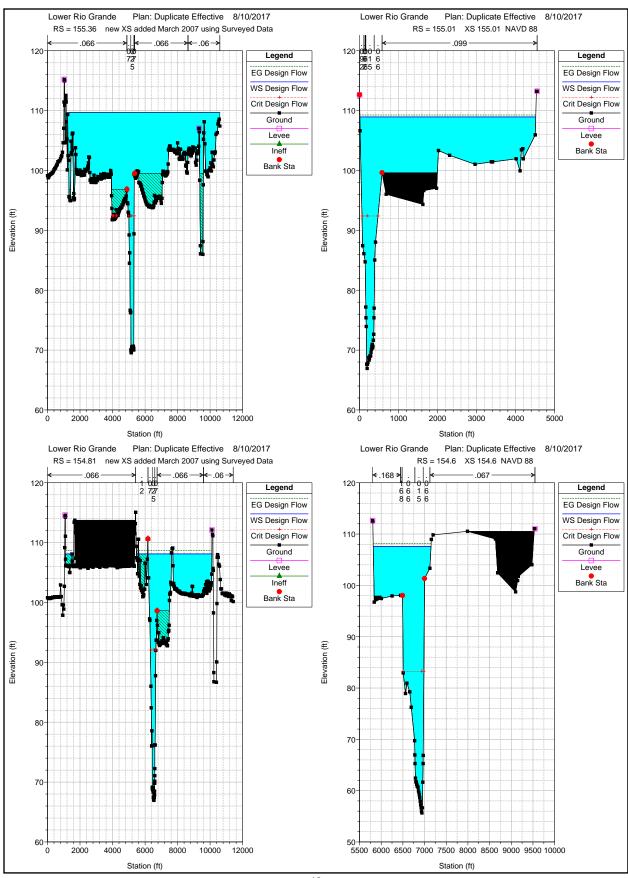


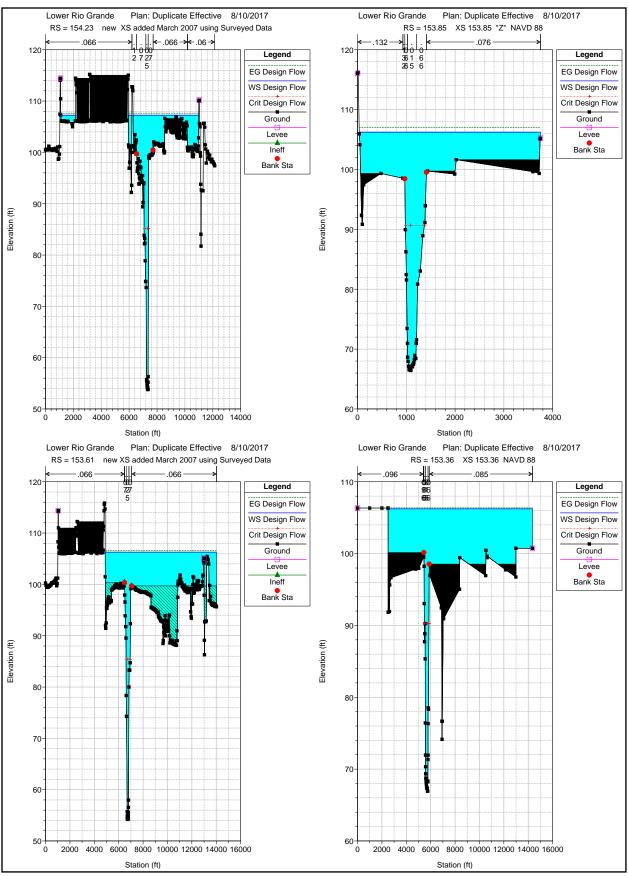


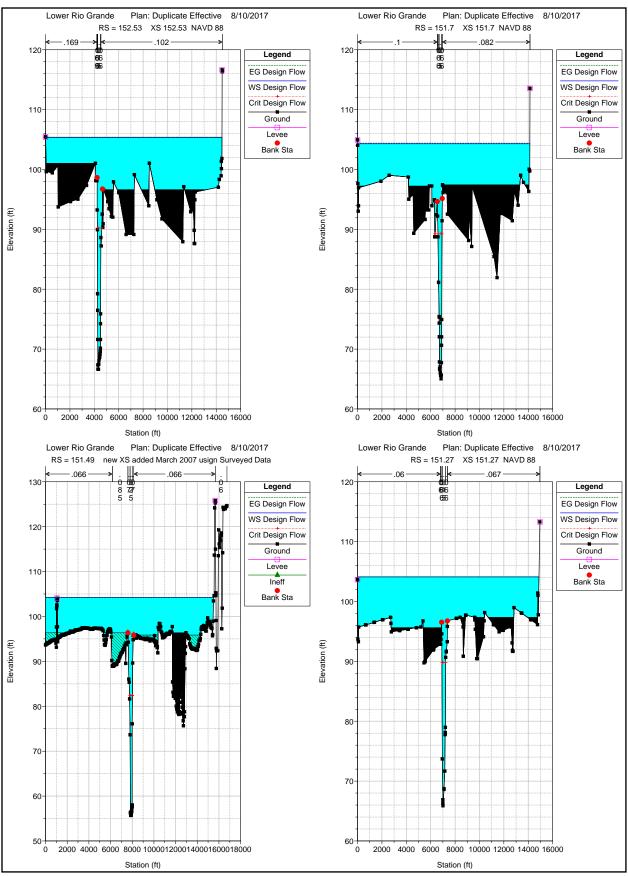


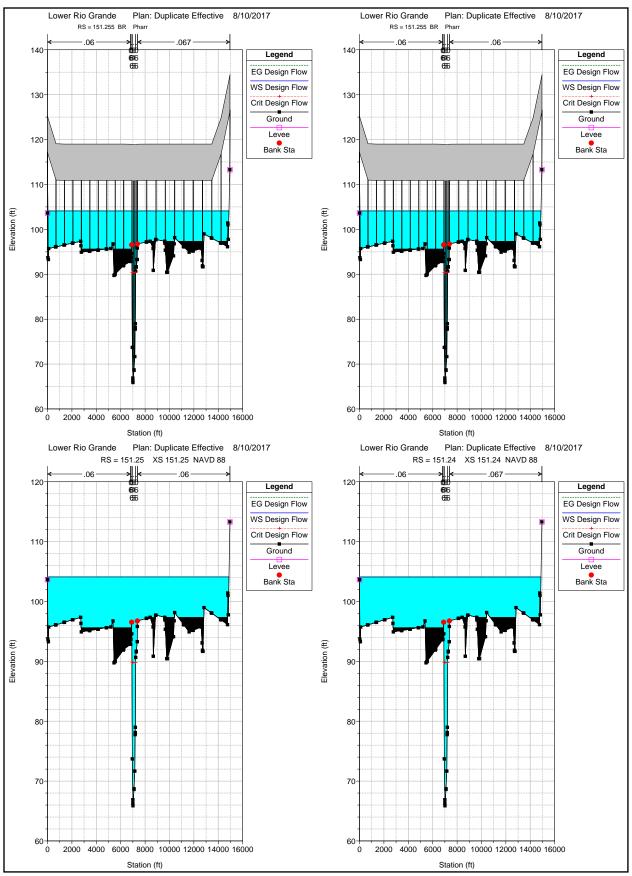


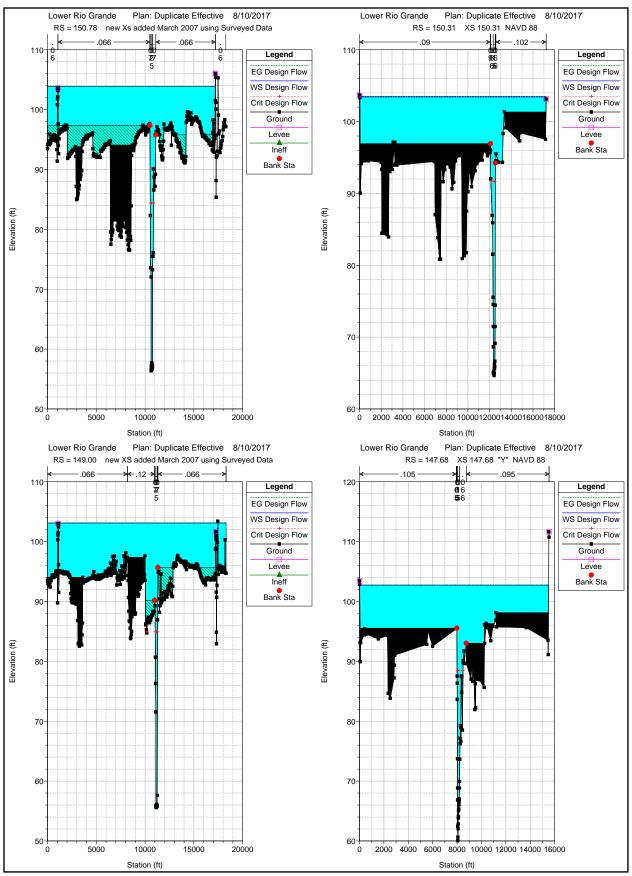


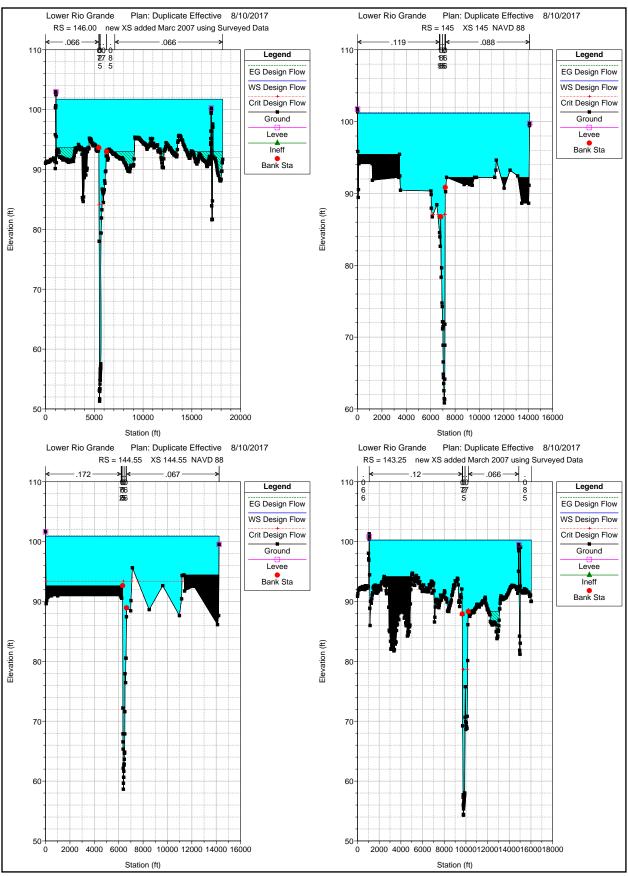


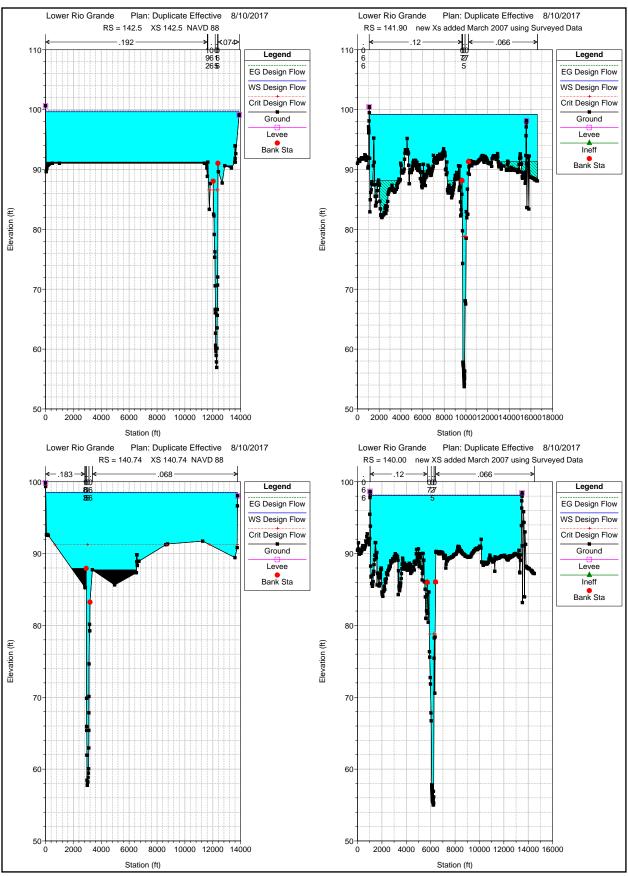


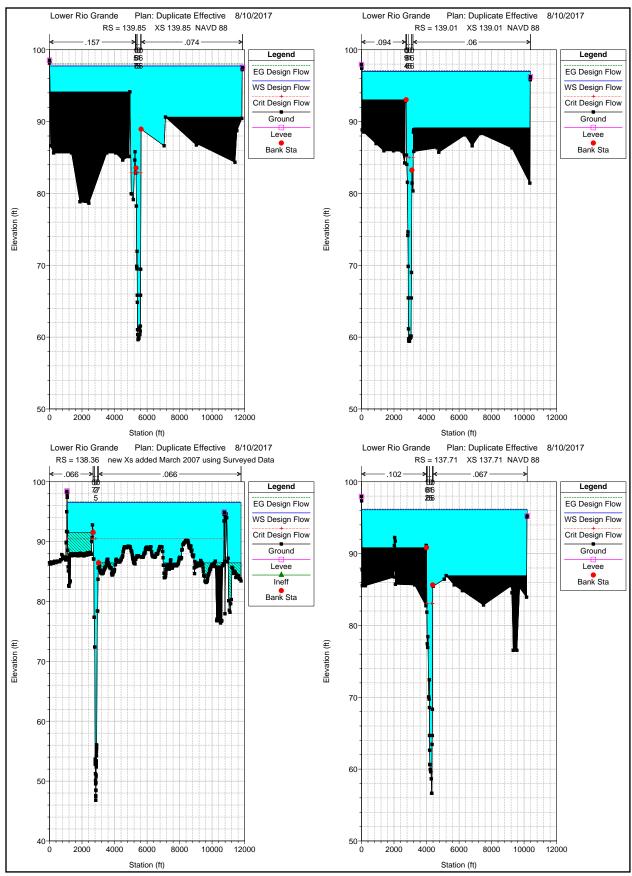


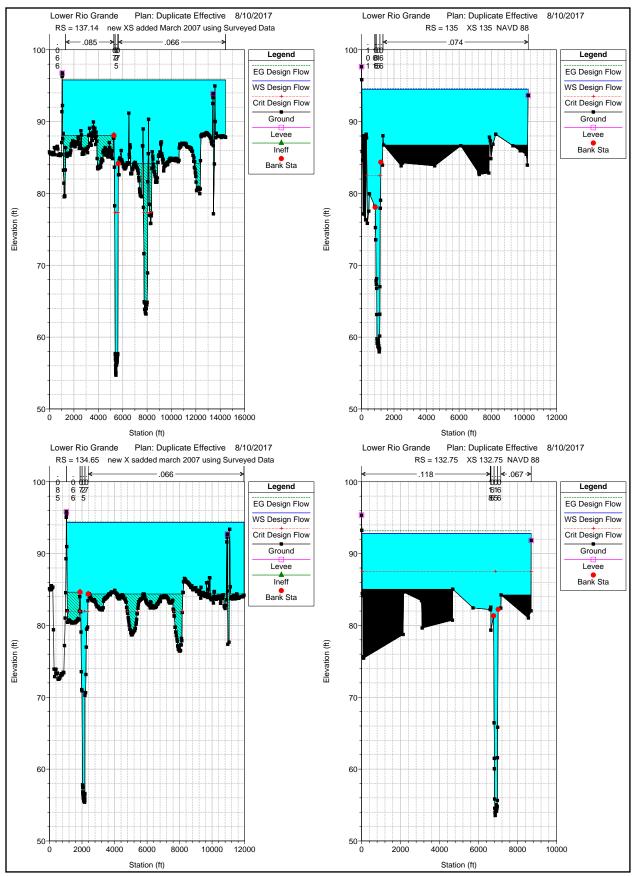


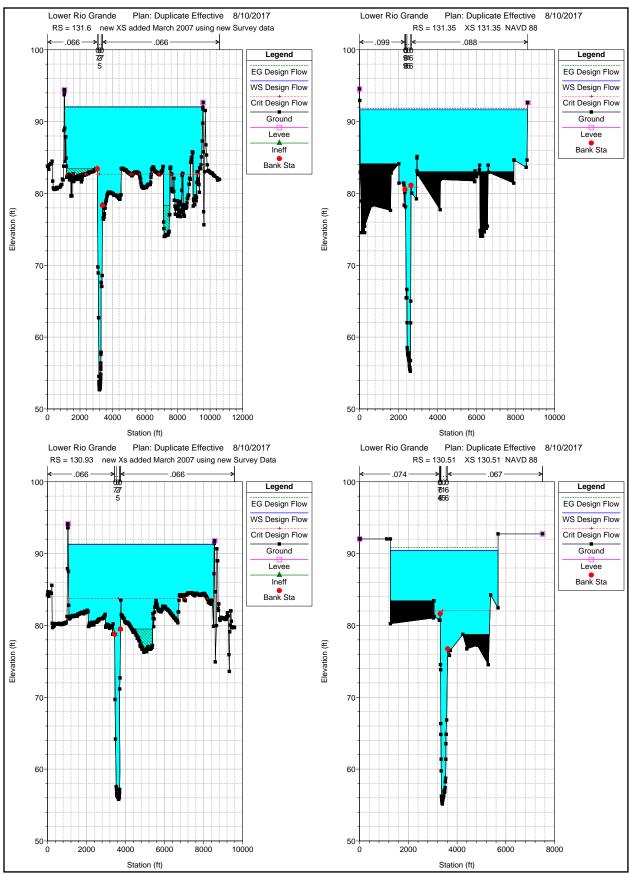


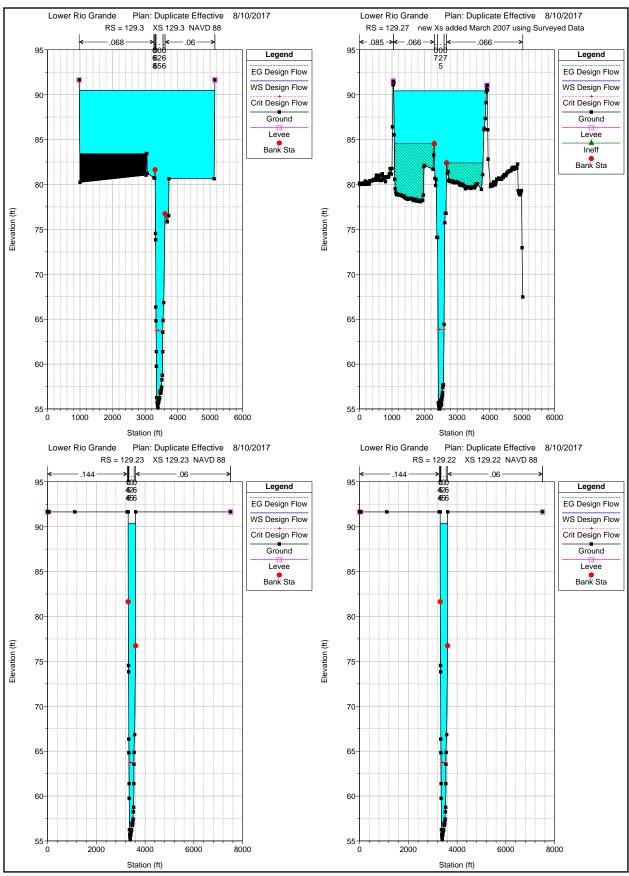


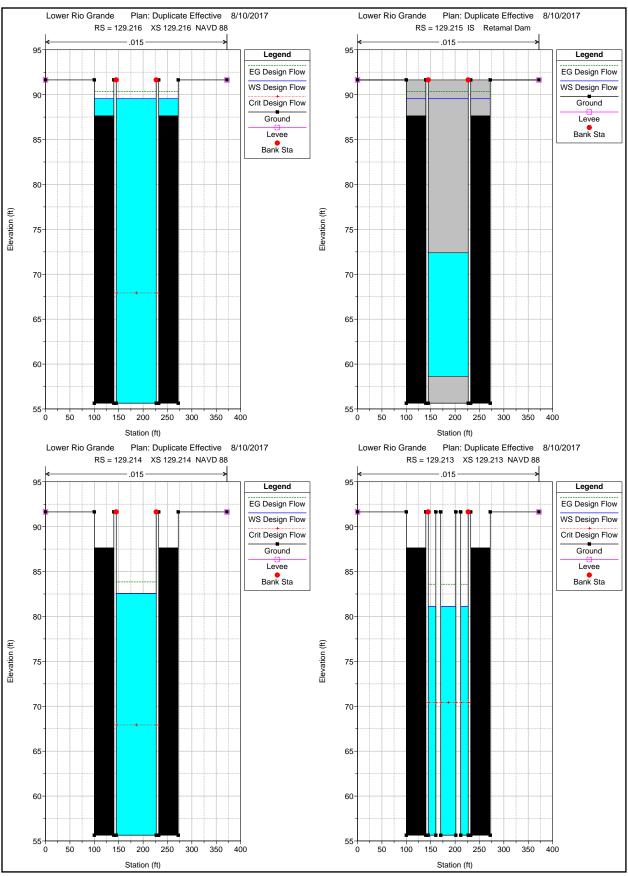


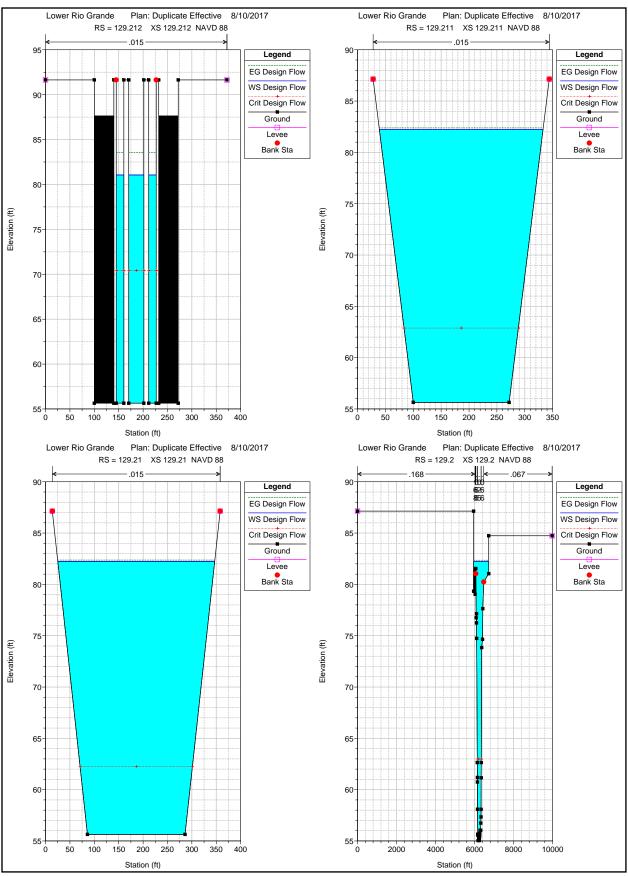


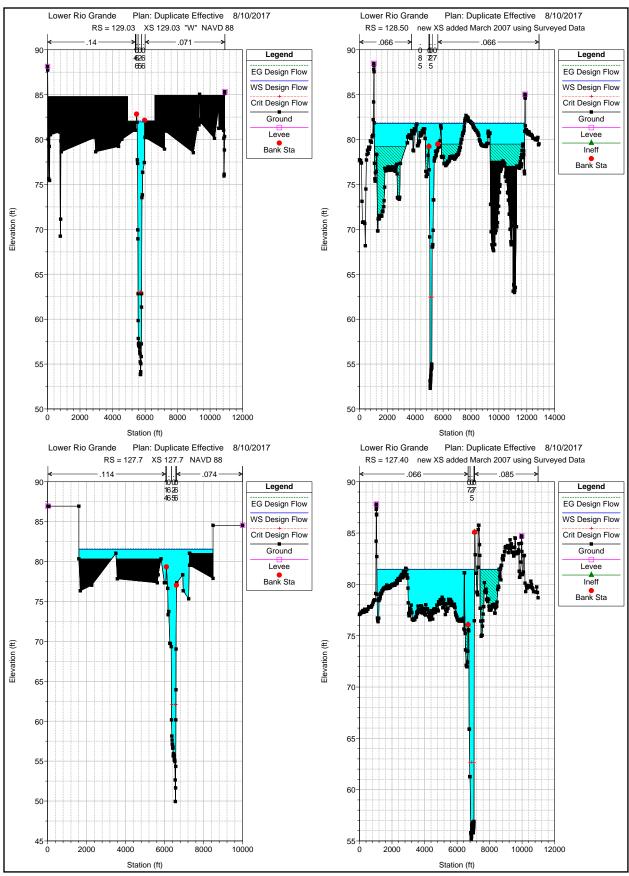


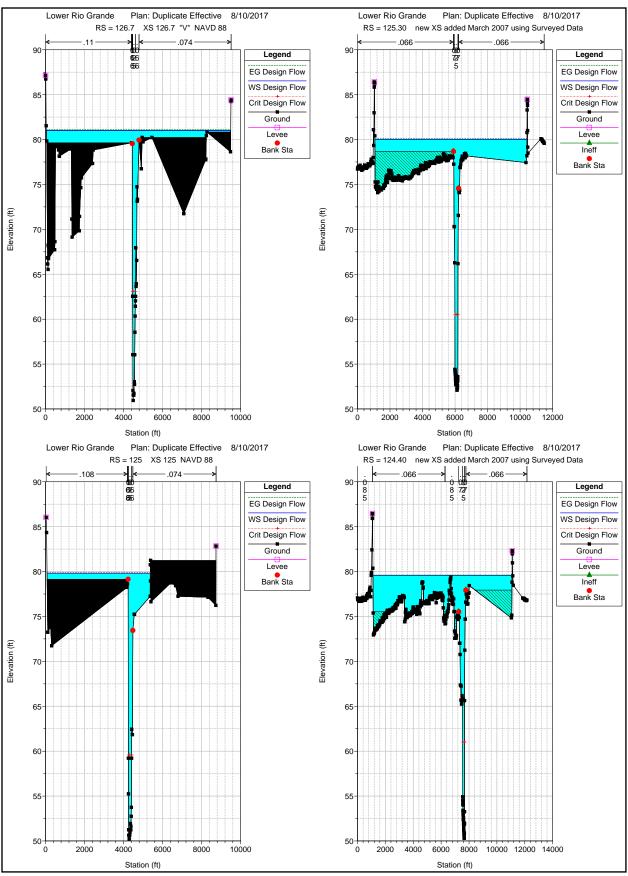


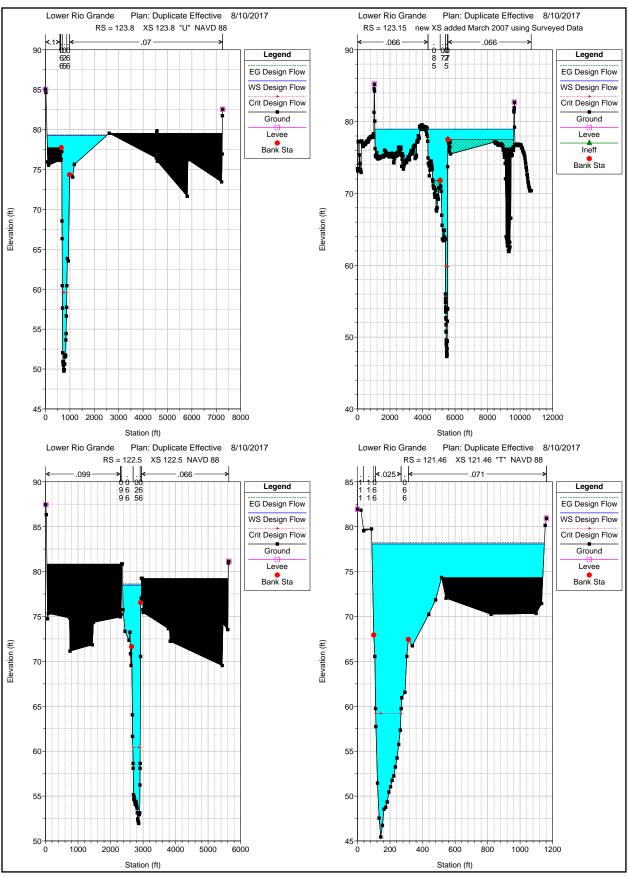


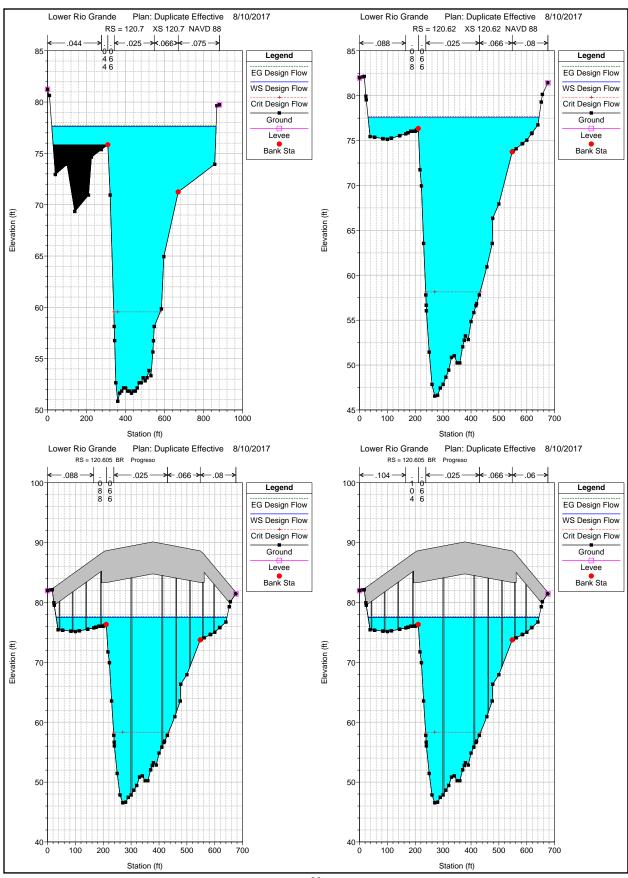


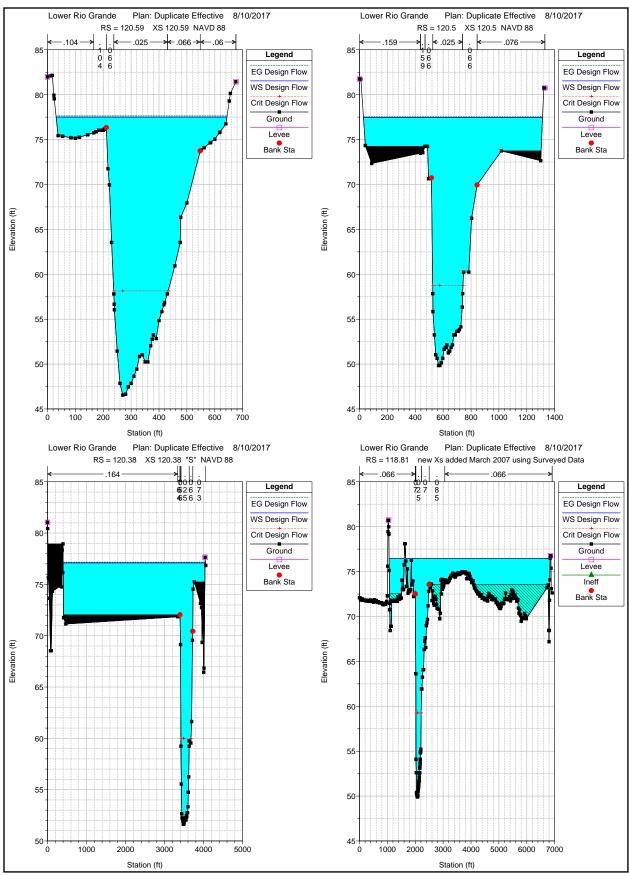


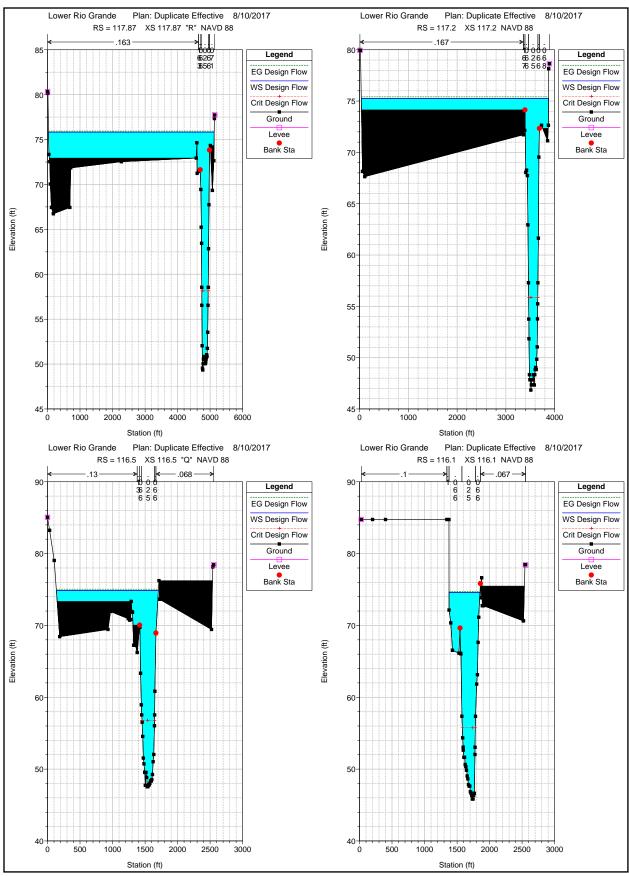


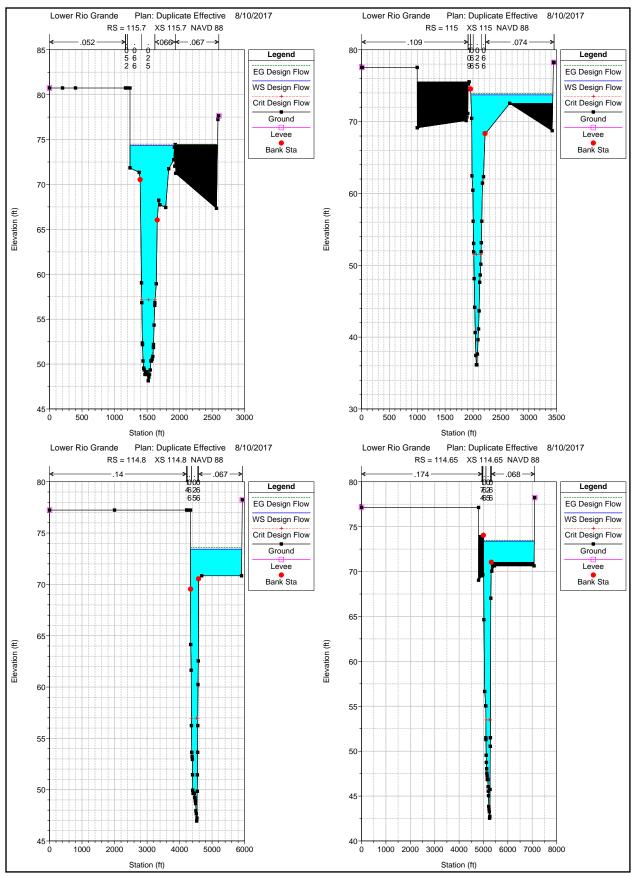


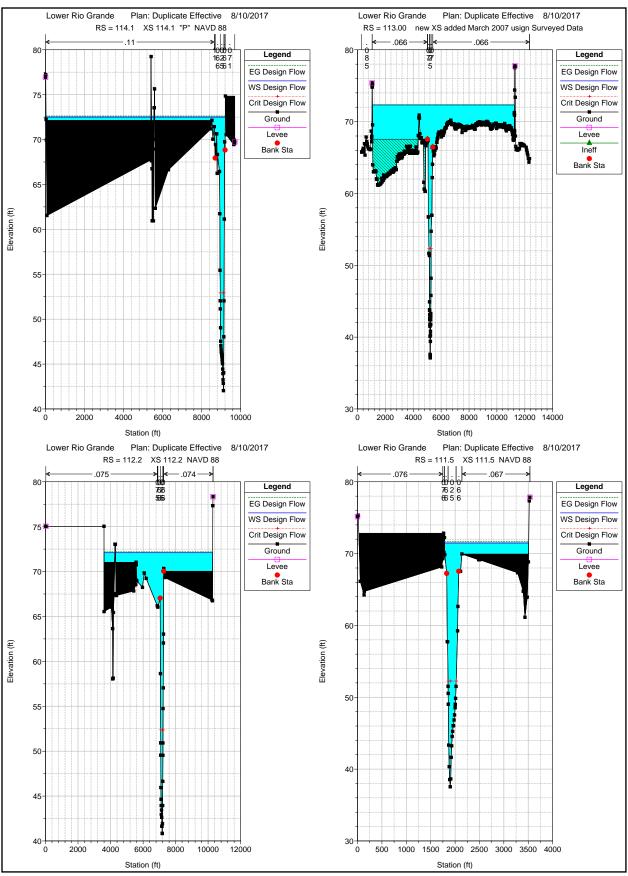


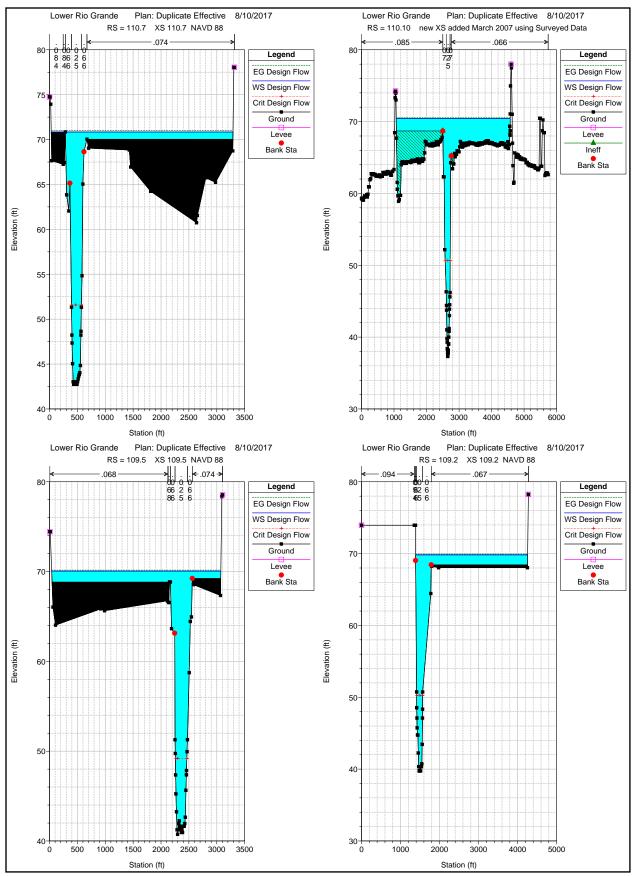


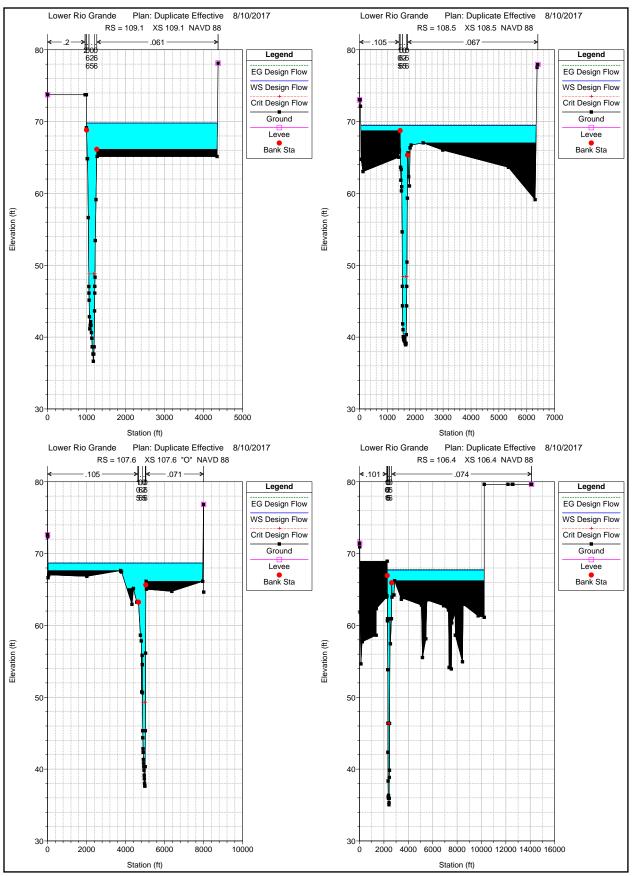


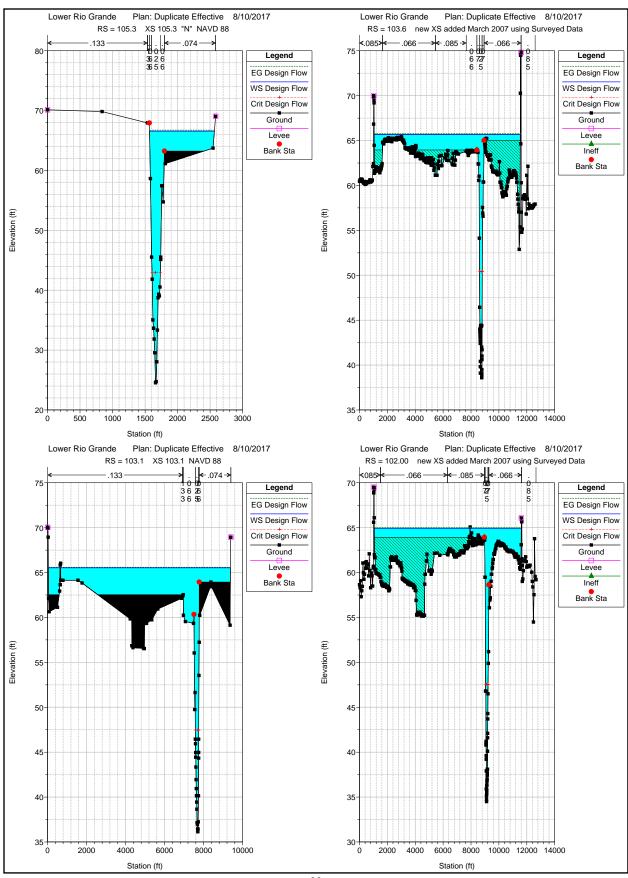


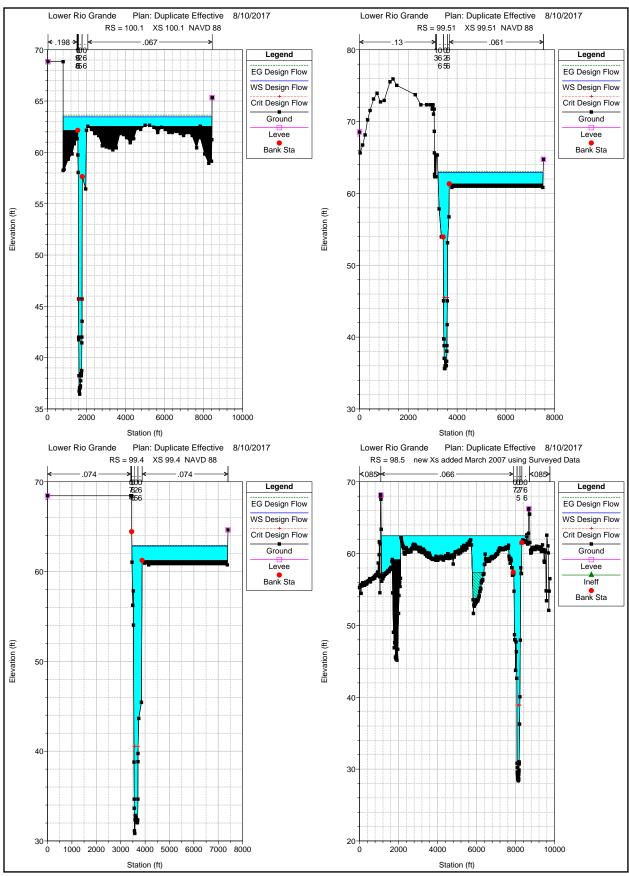


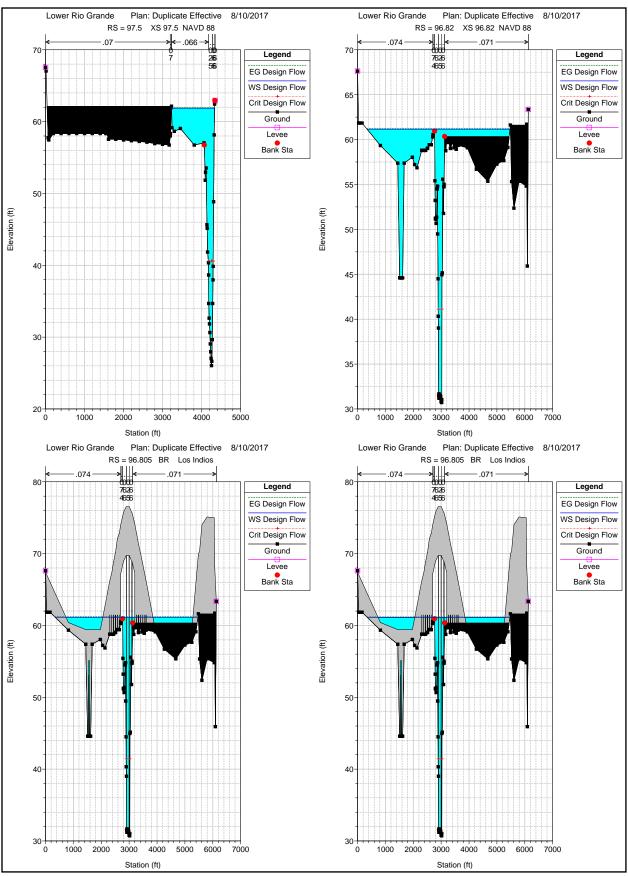


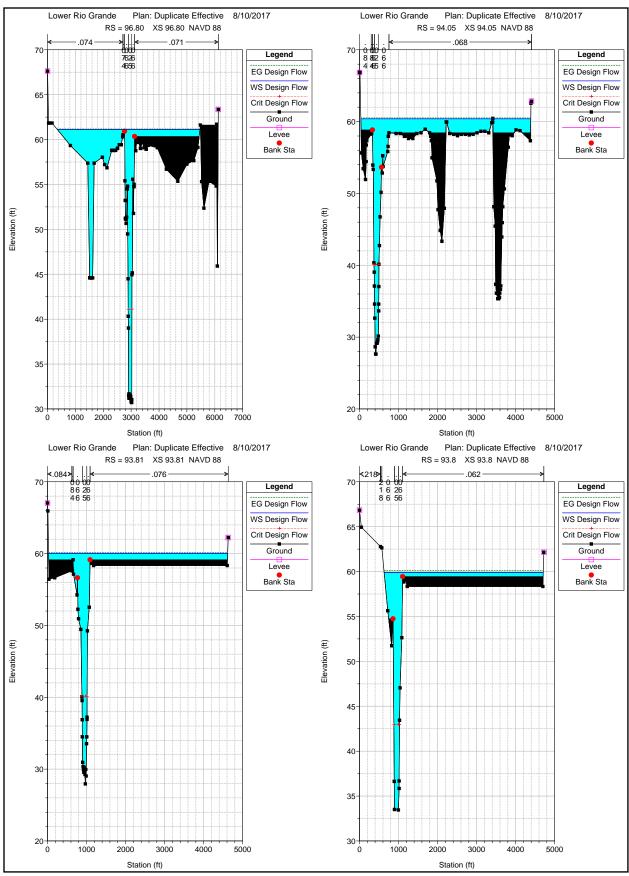


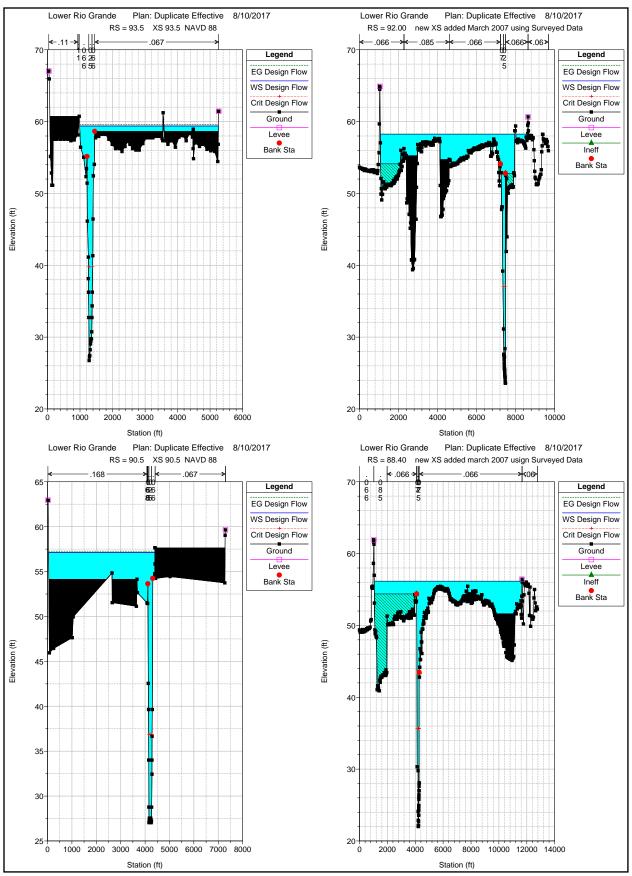


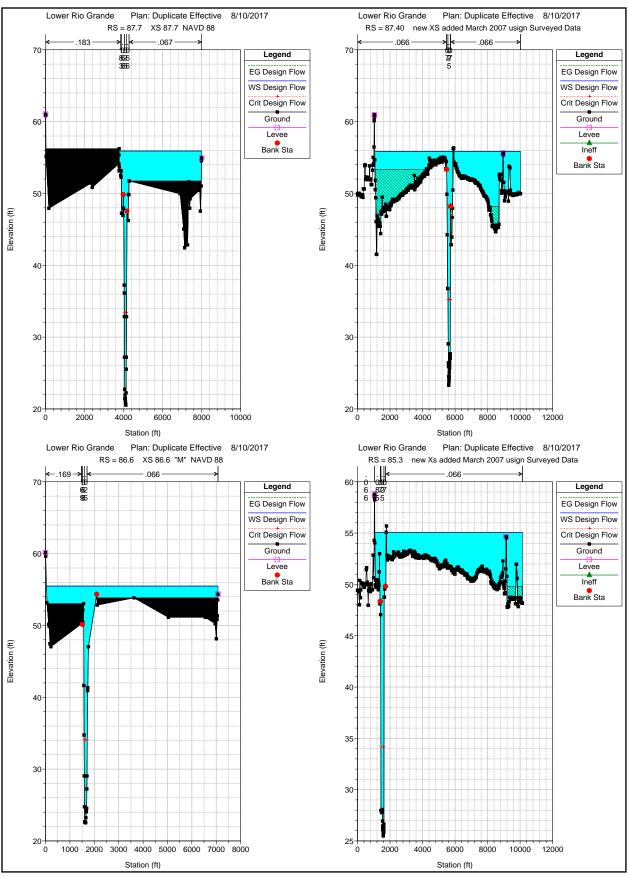


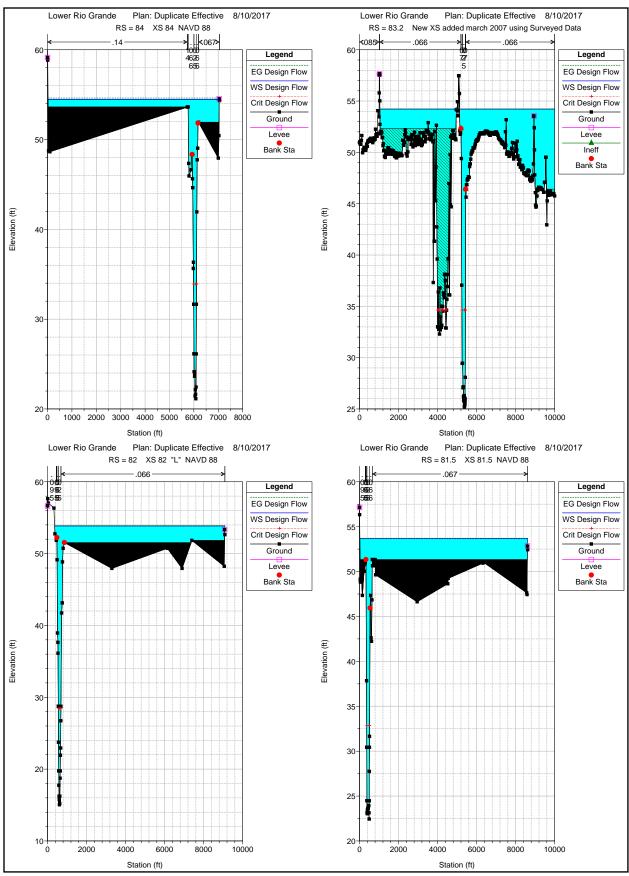


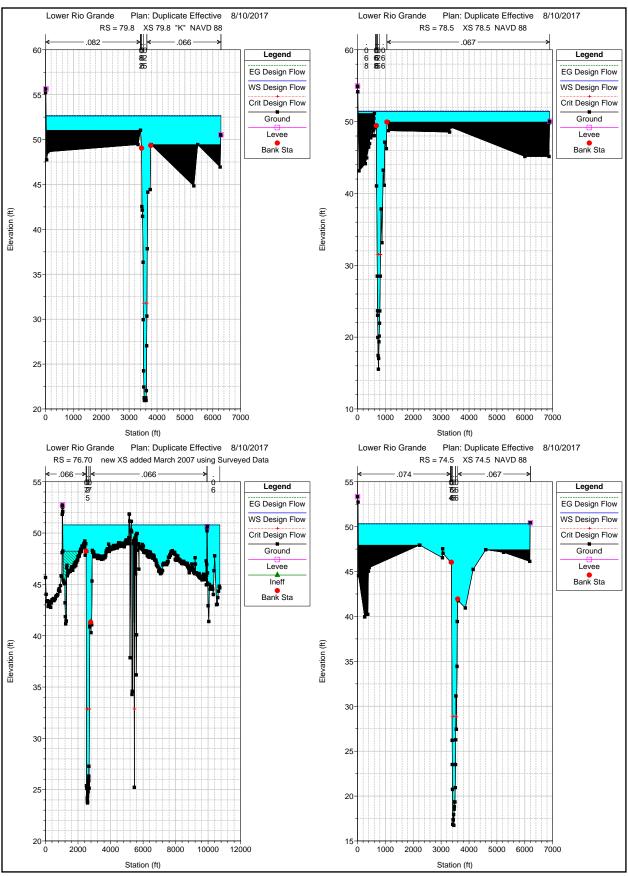


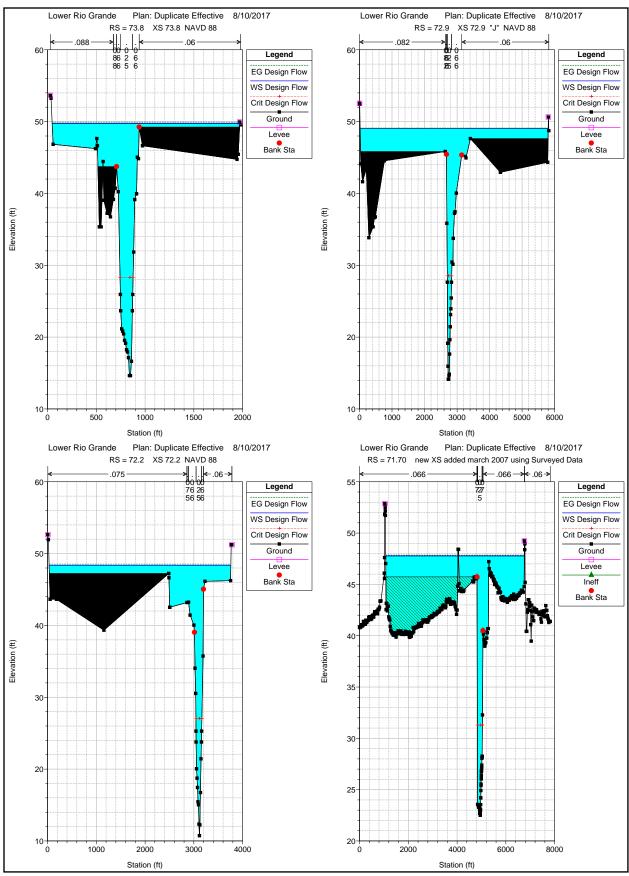


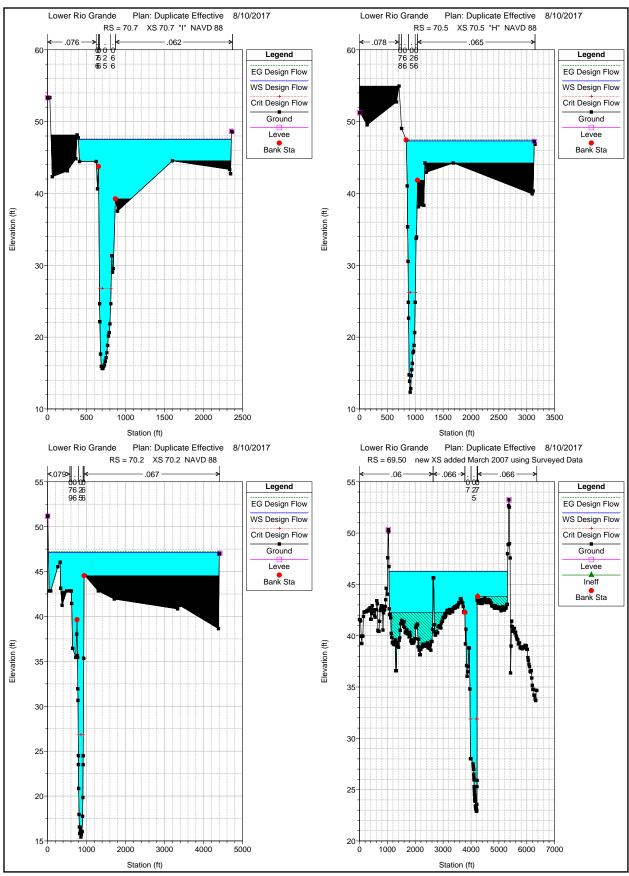


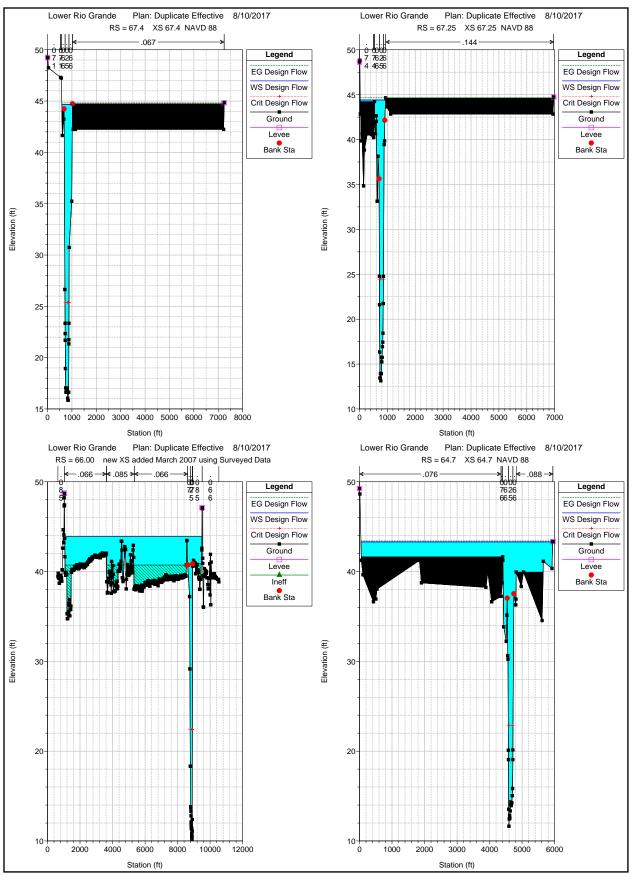


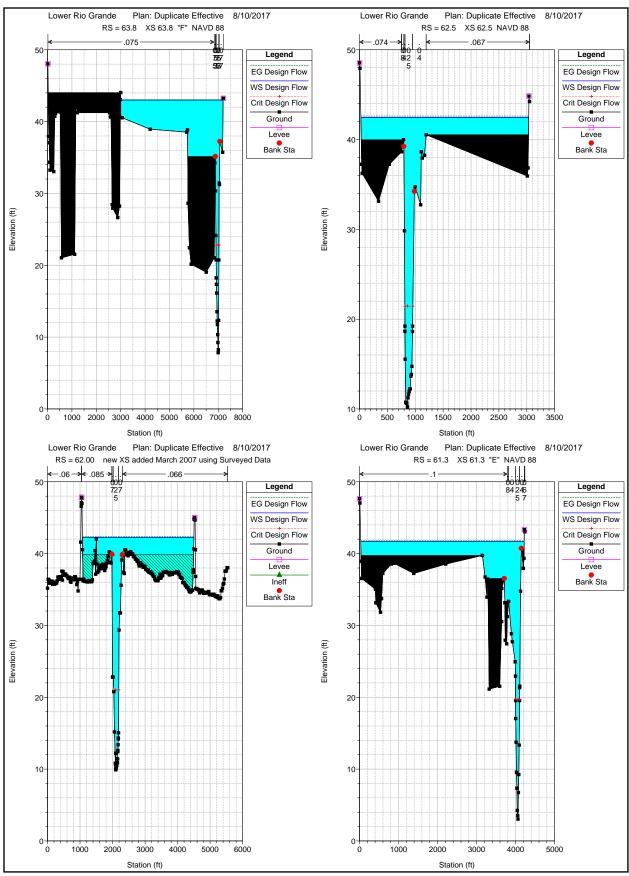


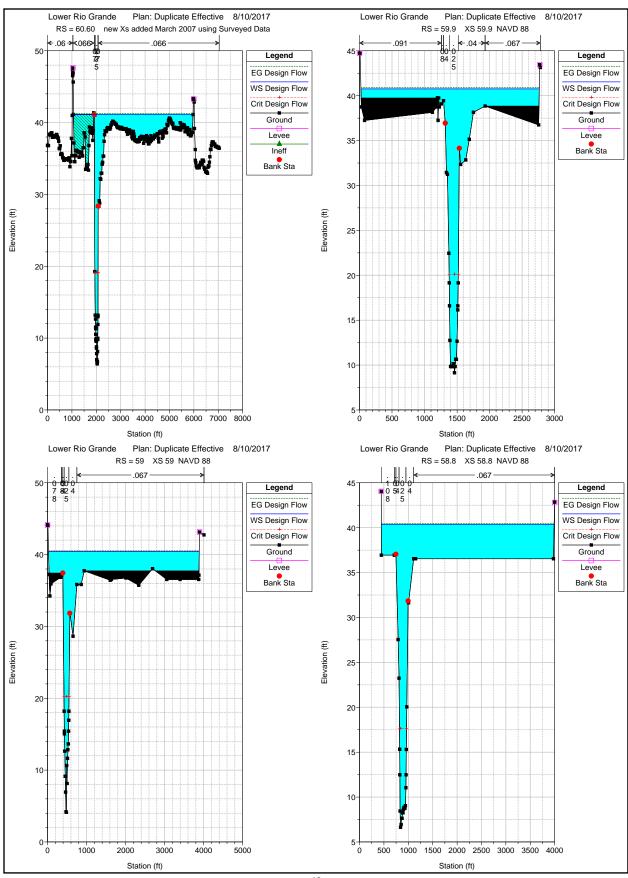


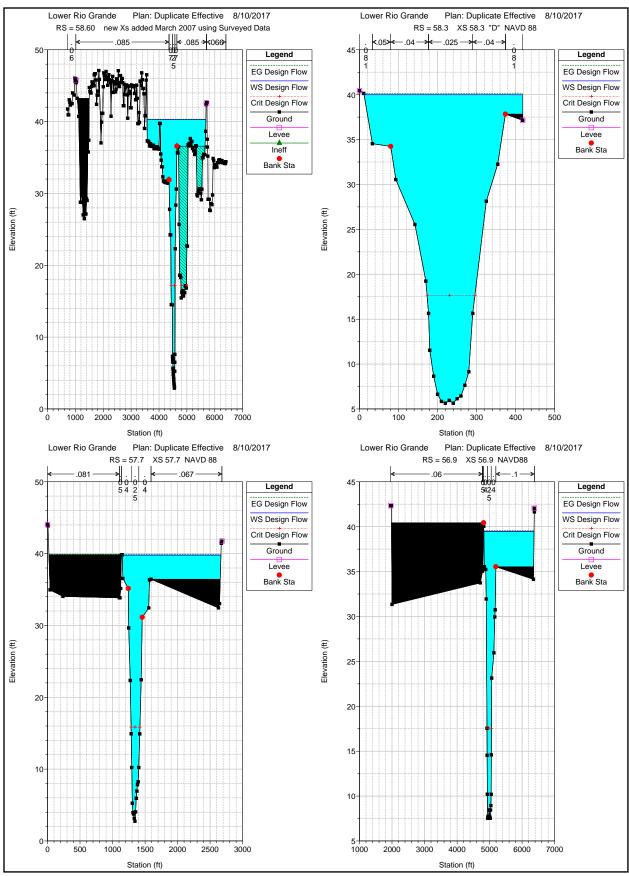


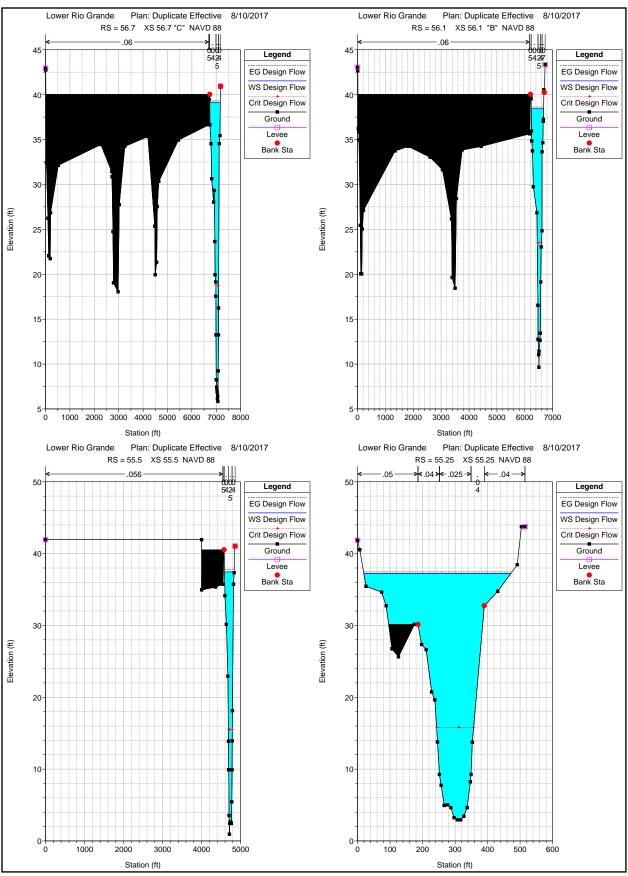


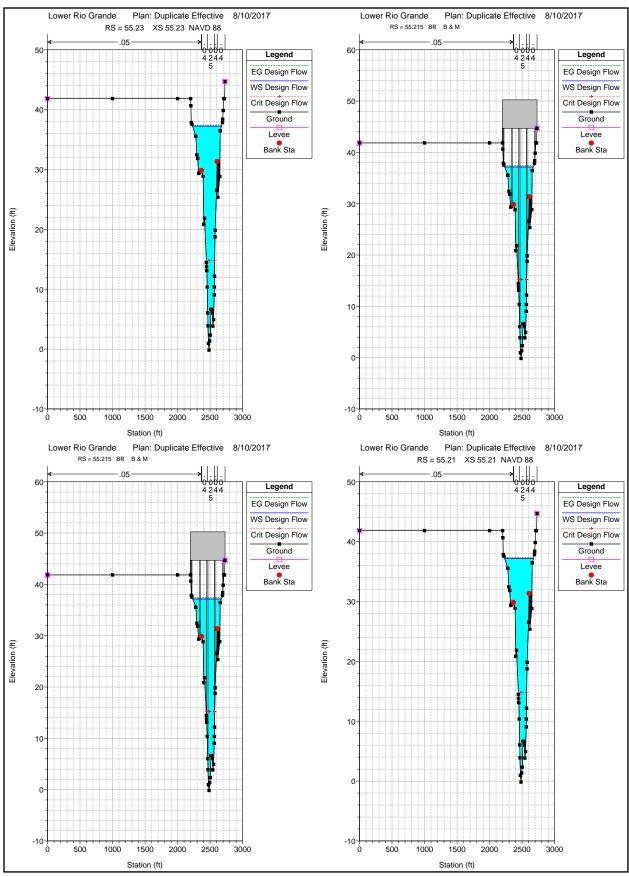


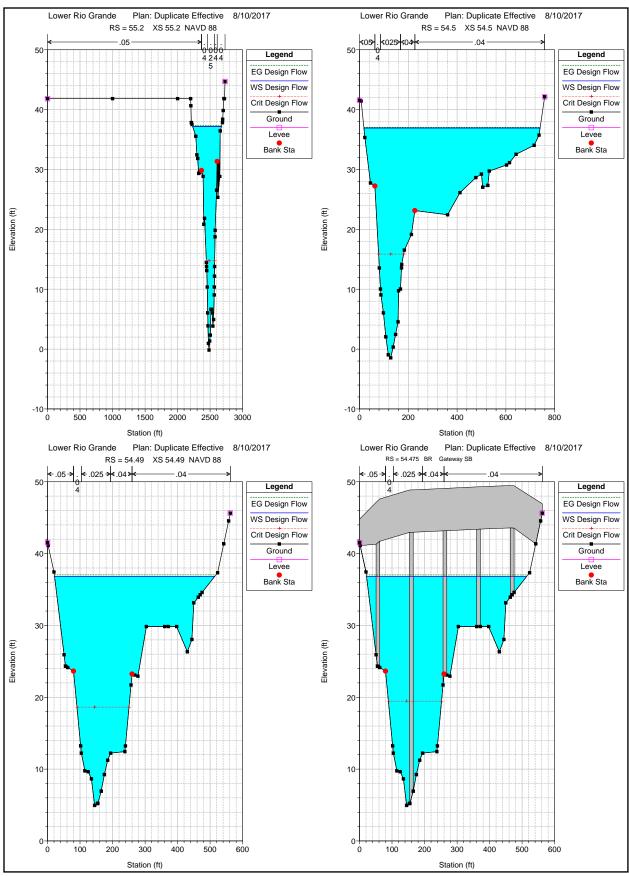


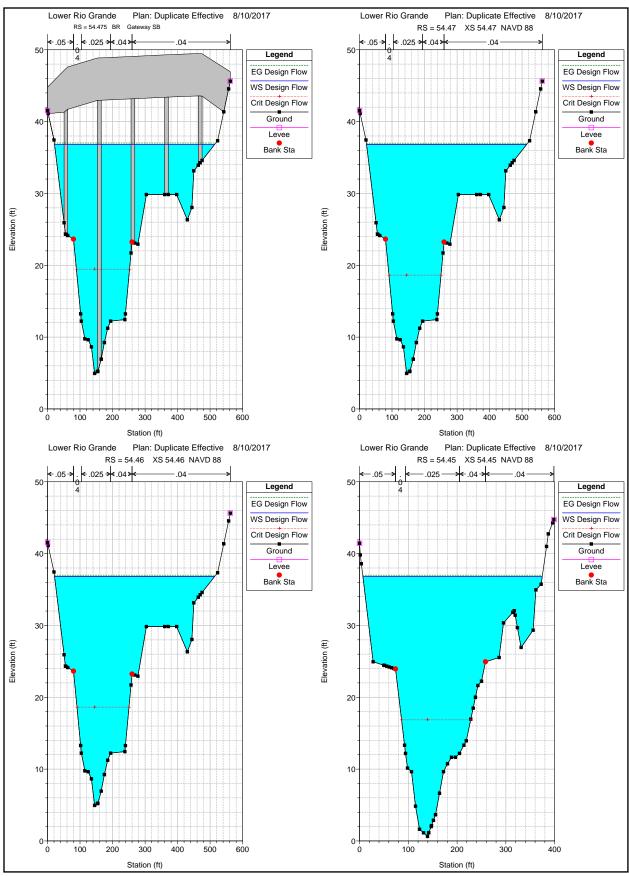


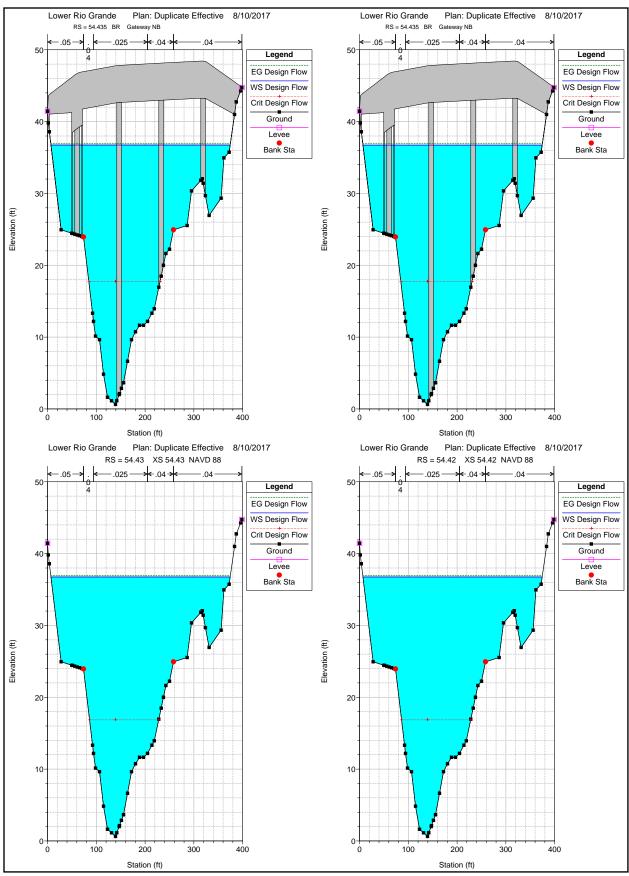


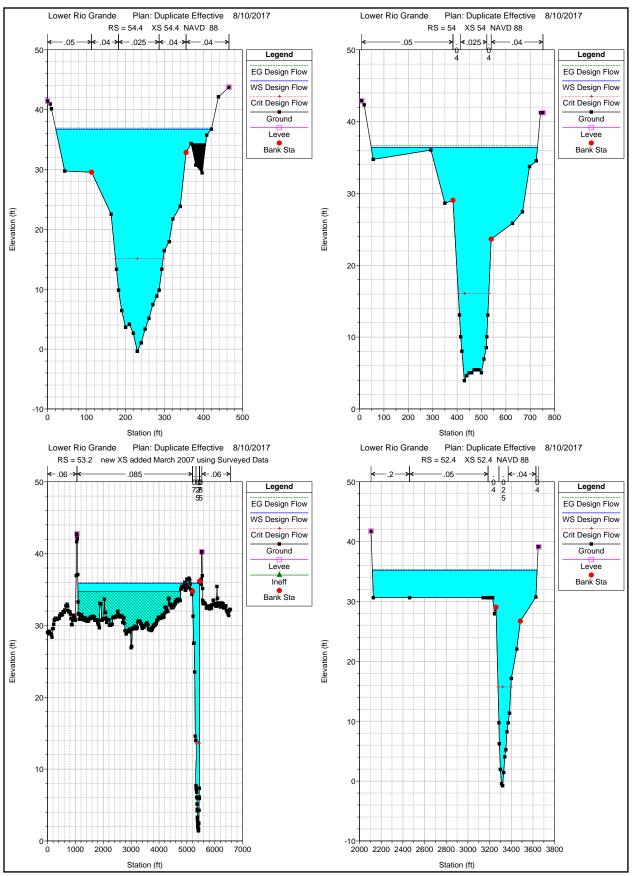


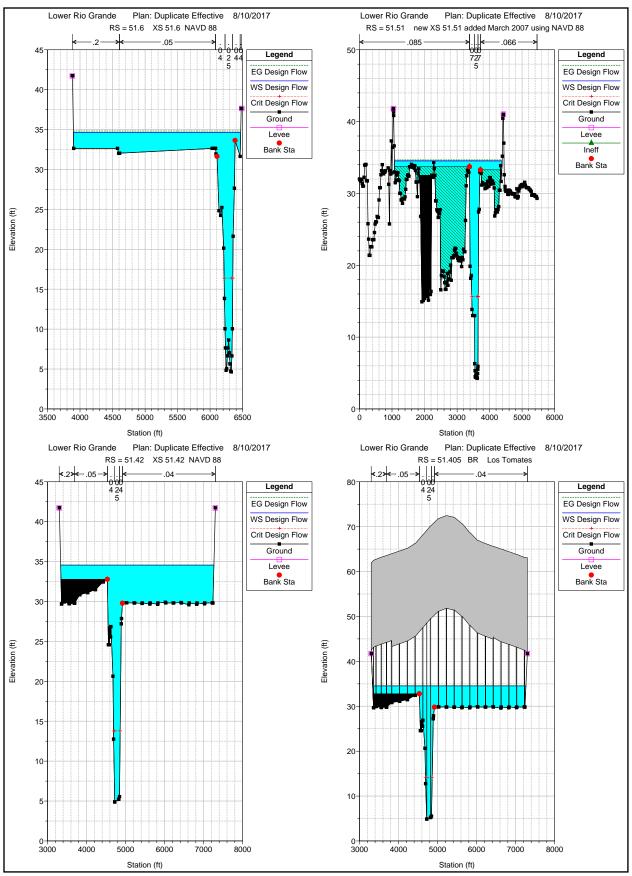


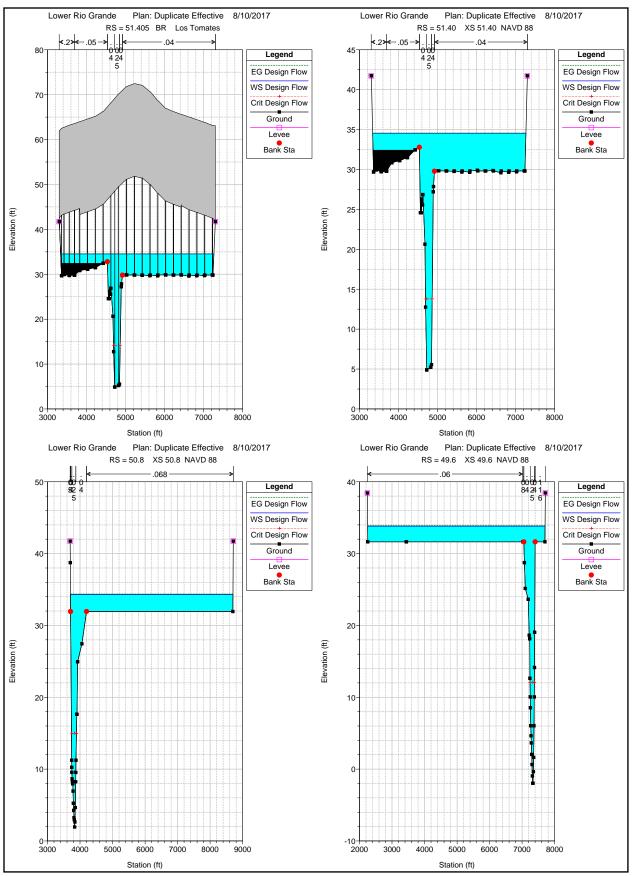


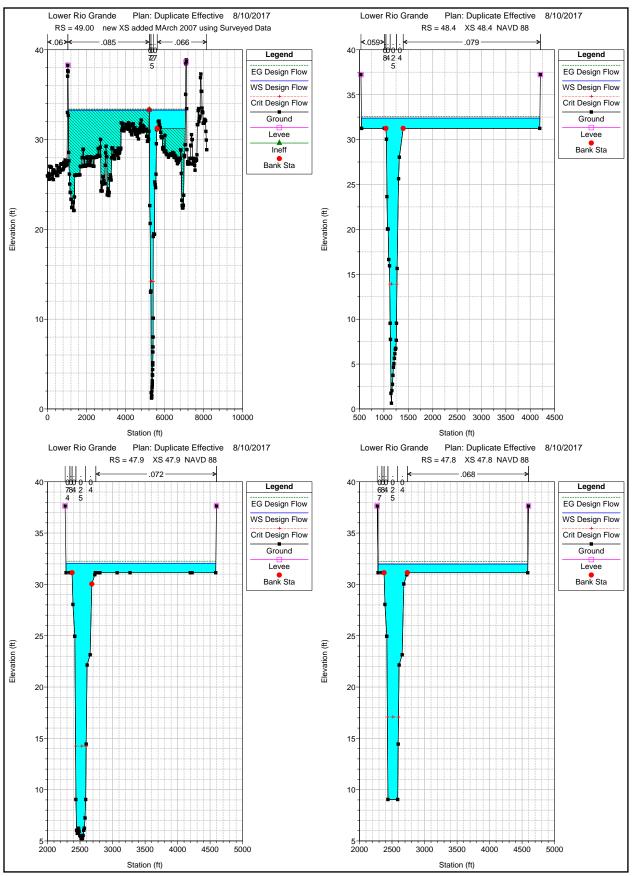


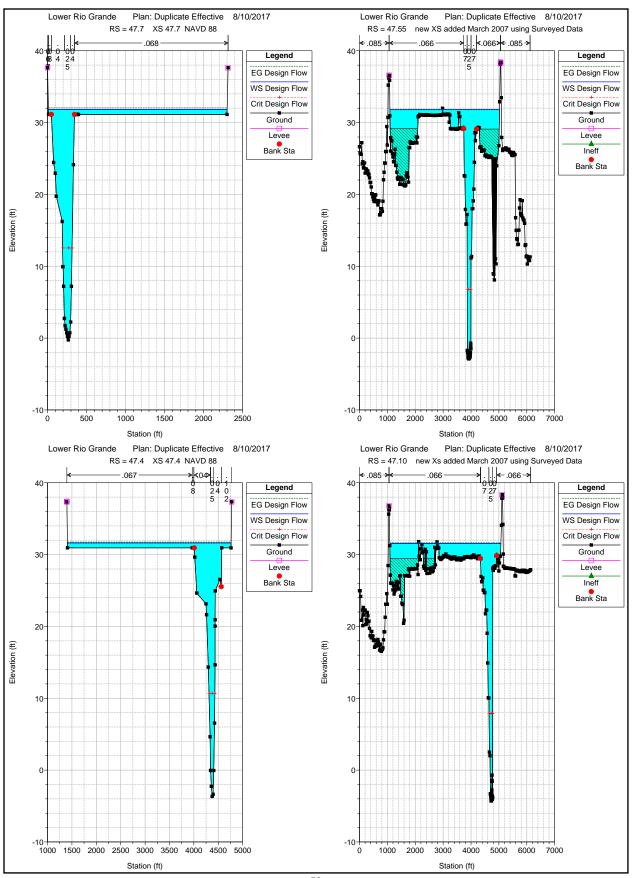


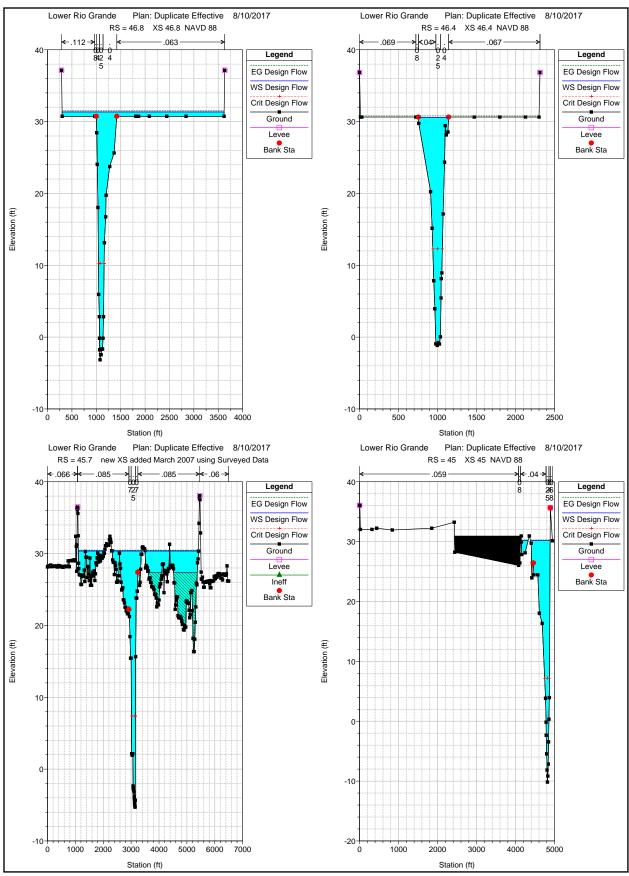


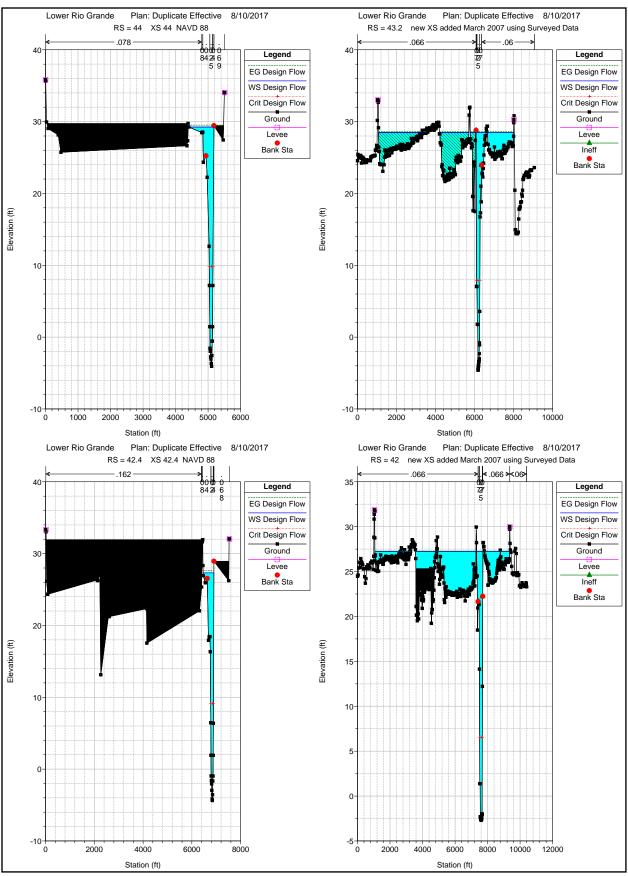


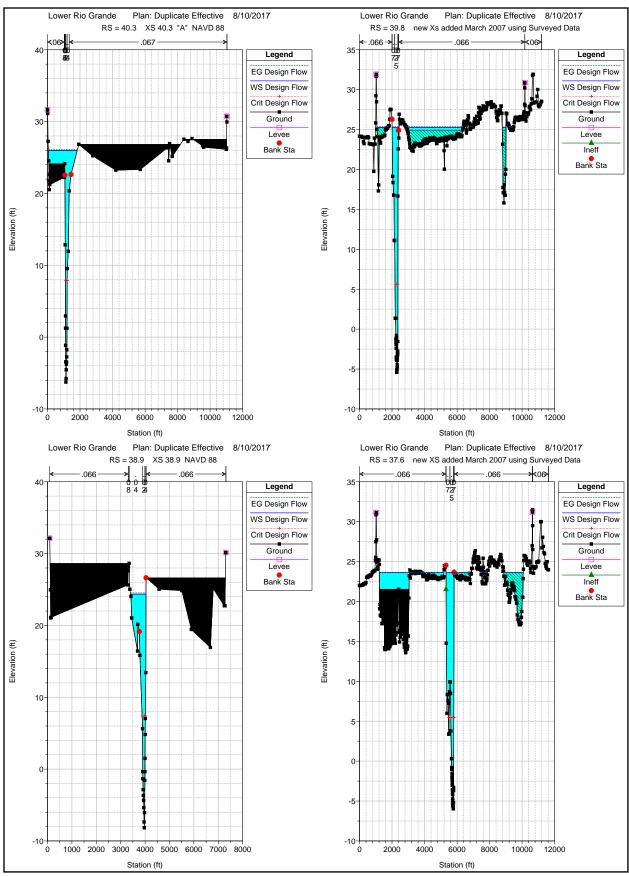


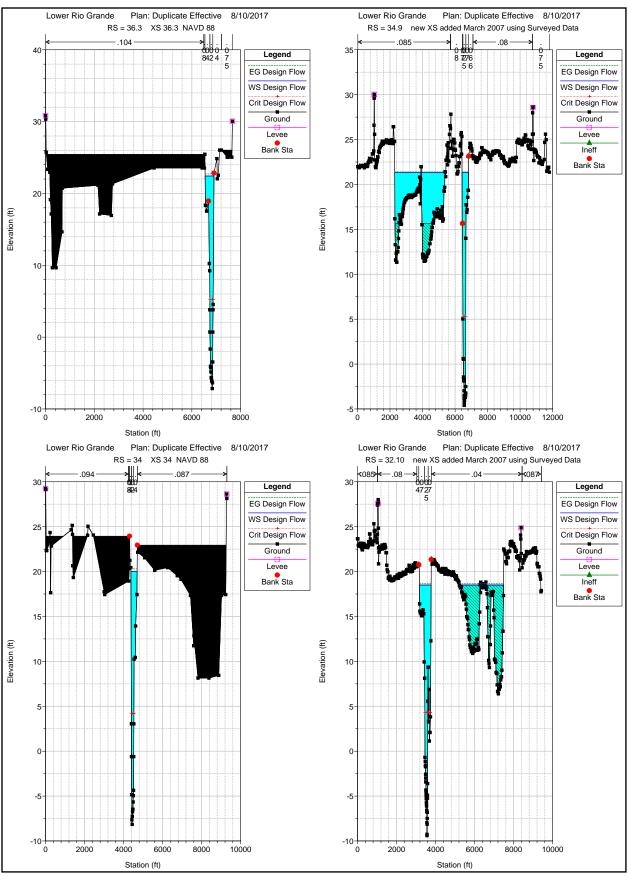


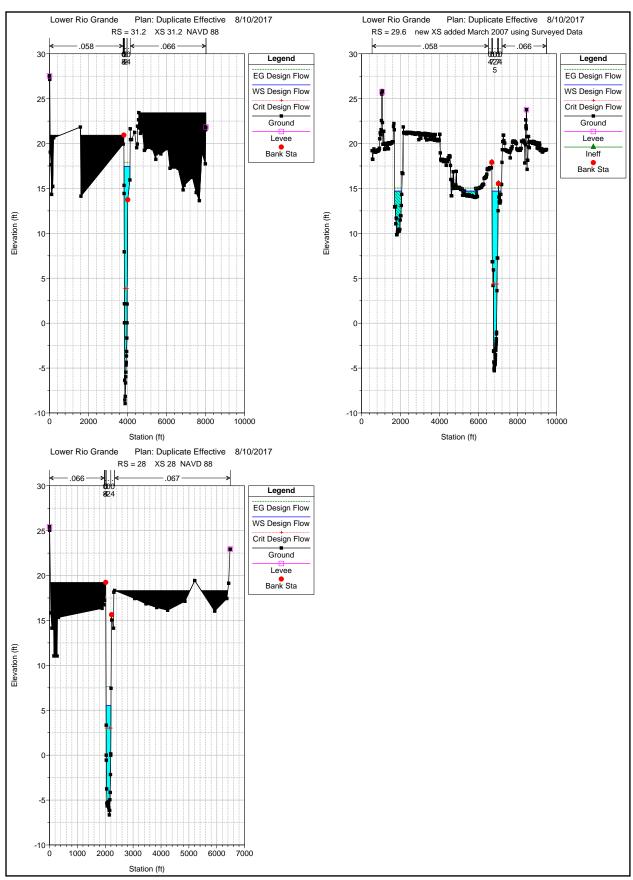












| | HEC-RAS Plan: | Duplicate Effec | ctive River: Rio (| Grande Reach: | Lower Reach | Profile: Design | ın Flow | | | | | | |
|---|----------------------------|------------------|----------------------------|------------------------|----------------|------------------|------------------|------------------|----------------------|---------------|------------------------|----------------------|--------------|
| | Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
| | | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| | Lower Reach
Lower Reach | 186
185.00 | Design Flow
Design Flow | 235000.00
235000.00 | 85.94
73.20 | 133.30
133.12 | 122.24
122.00 | 133.40
133.17 | 0.000069
0.000116 | 4.66
2.89 | 169066.50
154196.10 | 10519.00
10812.04 | 0.14 |
| | Lower Reach | 184 | Design Flow | 235000.00 | 86.64 | 132.61 | 123.23 | 132.83 | 0.000110 | 6.26 | 132383.30 | 10724.00 | 0.03 |
| | Lower Reach | 183.20 | Design Flow | 235000.00 | 89.30 | 132.16 | 121.41 | 132.22 | 0.000098 | 3.59 | 167716.80 | 12707.92 | 0.11 |
| | Lower Reach | 182.4 | Design Flow | 235000.00 | 79.14 | 131.62 | 124.13 | 131.80 | 0.000077 | 6.31 | 190587.00 | 15357.50 | 0.17 |
| | Lower Reach | 181.35 | Design Flow | 235000.00 | 92.00 | 131.39 | 118.59 | 131.45 | 0.000043 | 3.61 | 208111.60 | 12575.24 | 0.11 |
| | Lower Reach | 180.3
179.40 | Design Flow | 235000.00 | 87.04
84.40 | 130.69
130.43 | 121.17
117.30 | 131.05
130.46 | 0.000123
0.000074 | 7.62
2.59 | 136772.00 | 8444.98
13280.00 | 0.22 |
| | Lower Reach | 178.5 | Design Flow
Design Flow | 235000.00
235000.00 | 86.64 | 129.55 | 120.55 | 129.94 | 0.000074 | 7.88 | 210133.30
149018.50 | 11045.00 | 0.08 |
| RGV- | Lower Reach | 177.70 | Design Flow | 235000.00 | 87.00 | 129.26 | 117.39 | 129.32 | 0.000111 | 3.60 | 188344.50 | 11960.00 | 0.11 |
| | Lower Reach | 176.8 | Design Flow | 235000.00 | 88.84 | 128.02 | 118.04 | 128.61 | 0.000217 | 8.64 | 129546.70 | 8702.00 | 0.27 |
| 03 | Lower Reach | 175.60 | Design Flow | 235000.00 | 89.20 | 127.73 | 116.16 | 127.80 | 0.000104 | 3.50 | 162797.70 | 10840.00 | 0.11 |
| لــبـــا | Lower Reach | 174.6 | Design Flow | 235000.00 | 86.14 | 126.69 | 116.86 | 127.41 | 0.000113 | 9.03 | 152801.50
221388.90 | 10078.00
13360.00 | 0.27 |
| | Lower Reach
Lower Reach | 174.20
171.8 | Design Flow
Design Flow | 235000.00
235000.00 | 86.00
75.24 | 127.00
126.22 | 114.20
117.81 | 127.05
126.46 | 0.000040
0.000153 | 3.10
6.26 | 115171.70 | 8410.00 | 0.10
0.19 |
| RGV- | Lower Reach | 171.15 | Design Flow | 235000.00 | 73.00 | 125.98 | 113.56 | 126.17 | 0.000092 | 5.83 | 144128.30 | 8720.15 | 0.17 |
| | Lower Reach | 170.5 | Design Flow | 235000.00 | 74.24 | 123.03 | 116.51 | 125.51 | 0.000431 | 15.17 | 71032.92 | 4871.15 | 0.46 |
| 04 | Lower Reach | 170.26 | Design Flow | 235000.00 | 76.10 | 123.61 | 113.12 | 124.16 | 0.000393 | 7.51 | 82472.31 | 5461.90 | 0.26 |
| | Lower Reach | 170.02 | Design Flow | 235000.00 | 89.64 | 119.97 | 114.59 | 123.21 | 0.000338 | 16.76 | 68157.80 | 4848.19 | 0.54 |
| | Lower Reach Lower Reach | 169.83
169.49 | Design Flow
Design Flow | 130000.00
130000.00 | 89.64
86.70 | 120.79
121.39 | 111.87
105.34 | 122.40
121.64 | 0.000209
0.000249 | 11.88
5.12 | 63137.61
49384.53 | 4492.48
3402.26 | 0.38
0.17 |
| | Lower Reach | 169.14 | Design Flow | 130000.00 | 84.64 | 120.70 | 97.06 | 121.43 | 0.000249 | 6.88 | 18885.95 | 523.80 | 0.17 |
| | Lower Reach | 169.13 | | Inl Struct | | | | | | | | | |
| | Lower Reach | 169.12 | Design Flow | 130000.00 | 72.14 | 119.37 | 84.56 | 119.79 | 0.000021 | 5.26 | 24736.58 | 523.80 | 0.13 |
| | Lower Reach | 169.1 | Design Flow | 130000.00 | 83.64 | 119.24 | 95.38 | 119.77 | 0.000034 | 5.86 | 22169.07 | 658.30 | 0.18 |
| | Lower Reach
Lower Reach | 168.85
168.58 | Design Flow
Design Flow | 130000.00
130000.00 | 71.64
70.65 | 118.97
118.85 | 92.85
92.93 | 119.65
118.98 | 0.000477
0.000249 | 6.69
3.68 | 22309.86
76669.60 | 1070.00
6282.42 | 0.20
0.11 |
| | Lower Reach | 168.3 | Design Flow | 130000.00 | 75.34 | 117.82 | 93.97 | 118.30 | 0.000249 | 5.95 | 34733.78 | 2237.23 | 0.11 |
| | Lower Reach | 168.00 | Design Flow | 130000.00 | 71.95 | 117.70 | 94.09 | 117.85 | 0.000071 | 3.77 | 93470.21 | 7356.28 | 0.12 |
| | Lower Reach | 167.4 | Design Flow | 130000.00 | 74.14 | 117.26 | 95.98 | 117.54 | 0.000198 | 5.37 | 74645.82 | 6732.55 | 0.16 |
| | Lower Reach | 167.00 | Design Flow | 130000.00
130000.00 | 70.45 | 117.11 | 95.32 | 117.18 | 0.000111 | 2.92 | 95507.98 | 9563.32 | 0.09 |
| | Lower Reach
Lower Reach | 166.6
162.1 | Design Flow
Design Flow | 130000.00 | 71.34
69.75 | 116.83
115.57 | 96.55
93.04 | 116.96
115.59 | 0.000099
0.000094 | 4.50
1.79 | 143081.00
144853.90 | 12200.92
13227.38 | 0.13
0.06 |
| | Lower Reach | 161.4 | Design Flow | 130000.00 | 70.14 | 115.20 | 94.64 | 115.33 | 0.000132 | 4.28 | 123293.70 | 12191.50 | 0.13 |
| | Lower Reach | 159.16 | Design Flow | 130000.00 | 67.95 | 114.08 | 93.17 | 114.11 | 0.000065 | 1.91 | 141317.70 | 13617.98 | 0.06 |
| | Lower Reach | 157.15 | Design Flow | 130000.00 | 69.64 | 111.80 | 91.26 | 112.62 | 0.000276 | 8.04 | 32850.90 | 2402.00 | 0.24 |
| | Lower Reach | 156.93 | Design Flow | 125000.00 | 57.14 | 111.22 | 80.82 | 112.12 | 0.000199 | 7.75 | 18582.58 | 541.00 | 0.20 |
| | Lower Reach Lower Reach | 156.915
156.9 | Design Flow | Bridge
125000.00 | 57.14 | 110.77 | 80.82 | 111.65 | 0.000198 | 7.67 | 18343.26 | 541.00 | 0.20 |
| | Lower Reach | 156.87 | Design Flow | 125000.00 | 61.04 | 110.82 | 80.12 | 111.55 | 0.000133 | 7.25 | 23666.07 | 819.90 | 0.19 |
| | Lower Reach | 156.855 | | Bridge | | | | | | | | | |
| | Lower Reach | 156.84 | Design Flow | 125000.00 | 61.04 | 110.70 | 80.12 | 111.49 | 0.000097 | 7.42 | 23570.20 | 819.90 | 0.19 |
| | Lower Reach | 156.70 | Design Flow | 125000.00 | 70.75
60.94 | 110.87
110.27 | 90.55 | 111.19 | 0.000143
0.000235 | 5.09
7.66 | 44870.88 | 4060.00
2183.00 | 0.17 |
| | Lower Reach | 156.6
156.15 | Design Flow
Design Flow | 125000.00
125000.00 | 69.65 | 110.27 | 82.80
89.84 | 111.06
110.44 | 0.000235 | 3.83 | 24938.60
62092.23 | 5004.44 | 0.21
0.12 |
| | Lower Reach | 155.7 | Design Flow | 125000.00 | 68.64 | 109.84 | 92.62 | 110.04 | 0.000195 | 5.02 | 63417.36 | 5301.76 | 0.15 |
| | Lower Reach | 155.36 | Design Flow | 125000.00 | 69.55 | 109.67 | 92.42 | 109.72 | 0.000113 | 2.65 | 96459.14 | 9511.76 | 0.09 |
| | Lower Reach | 155.01 | Design Flow | 125000.00 | 66.94 | 108.95 | 92.41 | 109.26 | 0.000637 | 5.51 | 44965.98 | 4507.35 | 0.19 |
| | Lower Reach
Lower Reach | 154.81
154.6 | Design Flow
Design Flow | 125000.00
125000.00 | 66.95
55.64 | 108.12
107.57 | 92.08
83.25 | 108.68
108.19 | 0.000308
0.000445 | 7.00
6.50 | 35951.53
25378.30 | 4980.23
1332.12 | 0.25
0.19 |
| | Lower Reach | 154.23 | Design Flow | 125000.00 | 53.80 | 107.25 | 85.14 | 107.63 | 0.000443 | 5.23 | 37326.60 | 6006.44 | 0.19 |
| | Lower Reach | 153.85 | Design Flow | 125000.00 | 66.44 | 106.23 | 90.69 | 106.99 | 0.000821 | 7.84 | 30829.33 | 3714.66 | 0.26 |
| | Lower Reach | 153.61 | Design Flow | 125000.00 | 54.20 | 106.28 | 85.42 | 106.59 | 0.000112 | 5.46 | 68217.13 | 9127.24 | 0.19 |
| | Lower Reach | 153.36 | Design Flow | 125000.00 | 66.94 | 106.23 | 90.26 | 106.37 | 0.000210 | 4.34 | 91358.74 | 11834.99 | 0.15 |
| | Lower Reach
Lower Reach | 152.53
151.7 | Design Flow
Design Flow | 125000.00
125000.00 | 66.64
65.04 | 105.33
104.30 | 90.22
89.25 | 105.41
104.40 | 0.000234
0.000212 | 3.49
3.96 | 113106.80
104119.30 | 14464.67
14120.85 | 0.12
0.13 |
| RGV- | Lower Reach | 151.49 | Design Flow | 125000.00 | 55.70 | 104.17 | 82.40 | 104.40 | 0.000212 | 3.69 | 128084.50 | 15529.40 | 0.13 |
| 104 l | Lower Reach | 151.27 | Design Flow | 125000.00 | 65.88 | 104.12 | 89.83 | 104.16 | 0.000095 | 2.81 | 117094.30 | 14880.44 | 0.10 |
| للبئت | Lower Reach | 151.255 | Di | Bridge | 0= 0- | 40.4.1 | 20.5- | | 0.00005 | 0.5- | 4400015 | 44000 5 | |
| | Lower Reach | 151.25
151.24 | Design Flow
Design Flow | 125000.00
125000.00 | 65.88
65.88 | 104.11
104.10 | 89.83
89.83 | 104.14
104.14 | 0.000089 | 2.72
2.82 | 116924.80
116854.00 | 14880.34
14880.30 | 0.10
0.10 |
| | Lower Reach | 150.78 | Design Flow | 125000.00 | 56.38 | 103.88 | 84.38 | 103.91 | 0.000098 | 2.13 | 127619.50 | 17196.29 | 0.10 |
| | Lower Reach | 150.31 | Design Flow | 125000.00 | 64.64 | 103.44 | 91.62 | 103.54 | 0.000260 | 4.03 | 104044.90 | 17191.16 | 0.14 |
| | Lower Reach | 149.00 | Design Flow | 125000.00 | 55.60 | 103.12 | 84.93 | 103.14 | 0.000072 | 2.23 | 153618.60 | 18295.32 | 0.07 |
| | Lower Reach | 147.68 | Design Flow | 125000.00 | 60.04 | 102.72 | 88.46 | 102.77 | 0.000229 | 2.92 | 113927.40 | 15493.51 | 0.11 |
| | Lower Reach
Lower Reach | 146.00
145 | Design Flow
Design Flow | 125000.00
125000.00 | 51.30
60.84 | 101.73
101.18 | 84.19
87.08 | 101.75
101.25 | 0.000069
0.000125 | 1.49
3.65 | 149841.30
130561.40 | 17083.78
14102.41 | 0.06
0.12 |
| _ | Lower Reach | 144.55 | Design Flow | 125000.00 | 58.64 | 100.90 | 93.40 | 101.25 | 0.000125 | 3.51 | 127011.00 | 14102.41 | 0.12 |
| _ل | Lower Reach | 143.25 | Design Flow | 125000.00 | 54.30 | 100.24 | 78.61 | 100.28 | 0.000081 | 2.41 | 142898.80 | 14949.04 | 0.08 |
| RGV- | Lower Reach | 142.5 | Design Flow | 125000.00 | 56.94 | 99.64 | 86.59 | 99.79 | 0.000253 | 4.95 | 125322.30 | 13895.44 | 0.16 |
| | Lower Reach | 141.90 | Design Flow | 125000.00 | 53.73 | 99.19 | 78.81 | 99.22 | 0.000096 | 2.34 | 147411.90 | 15508.12 | 0.08 |
| 01 | Lower Reach
Lower Reach | 140.74 | Design Flow
Design Flow | 125000.00
125000.00 | 57.74
55.00 | 98.47
98.07 | 91.26
78.80 | 98.54
98.16 | 0.000098
0.000061 | 3.69 | 126370.90
125103.00 | 13771.99
12439.99 | 0.12
0.11 |
| | Lower Reach | 139.85 | Design Flow | 125000.00 | 59.64 | 97.75 | 82.87 | 98.03 | 0.000081 | 6.09 | 81683.98 | 11862.63 | 0.11 |
| , , , , , , , , , , , , , , , , , , , | Lower Reach | 139.01 | Design Flow | 125000.00 | 59.44 | 96.99 | 84.97 | 97.09 | 0.000193 | 4.12 | 78196.84 | 10368.68 | 0.14 |
| KGV- | Lower Reach | 138.36 | Design Flow | 125000.00 | 46.80 | 96.51 | 90.47 | 96.65 | 0.000095 | 4.93 | 96722.30 | 10692.48 | 0.17 |
| loo l | Lower Reach | 137.71 | Design Flow | 125000.00 | 56.64 | 96.11 | 83.05 | 96.19 | 0.000198 | 3.64 | 85186.28 | 10181.51 | 0.12 |
| للبكتا | Lower Reach Lower Reach | 137.14
135 | Design Flow
Design Flow | 125000.00
125000.00 | 54.70
57.94 | 95.80
94.50 | 77.33
82.46 | 95.83
94.62 | 0.000068
0.000169 | 2.57
4.39 | 132884.20
89689.34 | 13382.54
10236.52 | 0.08
0.14 |
| | | | | | 01.04 | 000 | S2. 10 | 052 | 2.300.00 | 50 | 22000.04 | | 5.17 |

HEC-RAS Plan: Duplicate Effective River: Rio Grande Reach: Lower Reach Profile: Design Flow (Continued) E.G. Slope Vel Chnl Top Width Froude # Chl Reach River Sta Profile Q Total Min Ch El W.S. Elev Crit W.S. E.G. Elev Flow Area (ft/ft) (sq ft) (ft) Lower Reach 134.65 Design Flow 125000.00 55.4 94.34 81.96 94.41 0.00006 113128.90 10908.08 0.12 Lower Reach 132.75 Design Flow 125000.00 53.54 92.79 87.52 93.17 0.000246 7.32 79075.87 8680.82 0.23 131.6 Design Flow 125000.00 52.7 92.04 82.68 92.09 0.000113 3.10 93635.81 8507.13 0.10 Lower Reach 131.35 Design Flow 125000.00 55.24 91.65 80.88 91.83 0.000269 5.32 78560.07 8593.17 0.17 Lower Reach 130.93 Design Flow 125000.00 55.8 91.26 83.72 91.33 0.00017 3.74 77942.19 7483.49 0.12 Lower Reach 130.51 Design Flow 125000.00 55.14 90.45 82.04 90.82 0.000297 6.79 47270.26 4415.64 0.22 Lower Reach 129.3 Design Flow 20000.00 55.14 90.46 63.74 90.47 0.00001 1.11 41213.71 4166.06 0.04 63.85 Lower Reach 129.27 Design Flow 20000.00 55.00 90.43 90.45 0.000032 1.39 25528.61 2852.84 0.05 63.74 308.78 0.07 Lower Reach 129.23 Design Flow 20000.00 55.14 90.33 90.41 0.000044 2.26 8851.54 Lower Reach 129.22 Design Flow 20000.00 55.14 90.32 63.74 90.40 0.000044 2.26 8850.59 308.78 0.07 Lower Reach 129.216 Design Flow 20000.00 55.64 89.55 67.92 90.33 0.000105 7.11 2933.55 162.00 0.22 Lower Reach 129.215 Inl Struc Lower Reach 129.214 Design Flow 20000.00 55.64 82.57 67.92 83.84 0.00020 9.06 2208.09 82.00 0.31 Lower Reach 129.213 Design Flow 20000.00 55.64 81.09 70.42 83.59 0.001146 12.67 1577.99 62.00 0.44 Lower Reach 129.212 Design Flow 20000.00 55.64 81.05 70.42 83.56 0.00115 12.69 1575.66 62.00 0.44 Lower Reach 129.211 Design Flow 20000.00 55.64 82.22 62.88 82.39 0.000019 3.23 6187.71 293.53 0.12 Lower Reach 129.21 Design Flow 20000.00 55.64 82.24 62.24 82.37 0.00001 2.88 6936.83 321.59 0.11 Lower Reach 129.2 Design Flow 20000.00 55.04 82.22 62.98 82.35 0.000228 2.91 7301.25 775.69 0.12 Lower Reach 129.03 Design Flow 20000.00 53.84 81.97 63.02 82.09 0.000225 2.80 7153.33 459.65 0.12 Lower Reach 128.50 Design Flow 20000.00 52.30 81.81 62.46 81.86 0.000037 2.10 27422.48 10278.30 0.11 Lower Reach 127.7 Design Flow 20000.00 49.9 81.54 62.10 81.60 0.000129 2.10 17891.7 6874.73 0.09 Lower Reach 127.40 Design Flow 20000.00 55.20 81.46 62.66 81.49 0.000051 1.68 25943.61 7449.28 0.07 Lower Reach 126.7 Design Flow 20000.00 50.9 81.01 63.10 81.14 0.00027 3.10 14640.83 9447.81 0.13 Lower Reach 125.30 Design Flow 20000.00 52.10 80.03 60.50 80.09 0.000101 2.36 22120.09 9355.42 0.09 Lower Reach 125 Design Flow 20000.00 50.2 79.76 59.57 79.90 0.000127 3.13 11586.04 5297.49 0.11 124.40 79.58 Lower Reach Design Flow 20000.00 50.30 61.01 79.61 0.000036 1.81 32469.46 9980.95 0.09 Lower Reach 123.8 Design Flow 20000.00 49.74 79.23 59.62 79.34 0.000143 2.73 10892.51 2438.89 0.11 Lower Reach 123.15 Design Flow 20000.00 47.30 78.94 59.83 78.96 0.000083 1.42 28247.80 8173.00 0.06 Lower Reach 122.5 Design Flow 20000.00 51.94 78.50 60.44 78.64 0.000103 3.09 7659.18 575.34 0.12 Lower Reach 121.46 Design Flow 20000.00 45.44 78.08 59.21 78.24 0.000122 3.44 9147.99 1060.81 0.12 Lower Reach 120.7 Design Flow 20000.00 50.84 77.63 59.56 77.74 0.00013 2.72 8487.52 842.40 0.11 Lower Reach 120.62 Design Flow 20000.00 46.54 77.54 58.15 77.68 0.000158 2.95 7286.39 612.96 0.12 Lower Reach 120.605 Bridge 46 54 77.51 58.15 77.64 0.000159 2.96 7263.69 612.66 0.12 Lower Reach 120.59 Design Flow 20000.00 49.84 77.45 1284.49 0.10 Lower Reach 120.5 Design Flow 20000.00 58.76 77.55 0.000101 2.66 10621.77 Lower Reach 120.38 Design Flow 20000.00 51.64 77.10 59.98 77.17 0.000087 2.40 22400.31 3634.95 0.09 Lower Reach 118.81 Design Flow 20000.00 49.90 76.43 59.25 76.47 0.000114 1.76 22005.11 5724.18 0.08 Lower Reach 117.87 Design Flow 20000.00 49.34 75.82 58.15 75.94 0.000130 3.02 19396.82 5094.89 0.12 Lower Reach 117.2 Design Flow 20000.00 46.84 75.25 55.86 75.41 0.00016 3.23 10219.60 3839.43 0.13 Lower Reach 116.5 Design Flow 20000.00 47.54 74.85 56.78 75.04 0.000124 3.54 7925.35 1568.89 0.13 45.84 Lower Reach 116.1 Design Flow 20000.00 74.60 55.76 74.74 0.000134 3.06 7346.24 475.59 0.12 74.32 Lower Reach 115.7 Design Flow 20000.00 48.14 57.15 74.49 0.000124 3.36 7343.12 695.88 0.13 Lower Reach 115 Design Flow 20000.00 36.14 73.73 51.53 73.90 0.000183 3.43 7918.83 1472.11 0.13 Lower Reach 114.8 Design Flow 20000.00 46.94 73.43 56.96 73.61 0.000144 3.56 8567.86 1575.25 0.14 Lower Reach 114.65 Design Flow 20000.00 42.54 73.38 53.48 73.49 0.000128 2.72 10809.69 2082.70 0.11 Lower Reach 114.1 Design Flow 20000.00 42.04 72.51 52.92 72.63 0.000296 2.76 10549.92 9129.60 0.13 Lower Reach 113.00 Design Flow 20000.00 37.1 72.33 52.31 72.34 0.00002 1.52 44380.48 10201.35 0.06 Lower Reach 112.2 Design Flow 20000.00 40.84 72.10 52.36 72.20 0.000116 2.93 19140.96 6639.66 0.11 Lower Reach 111.5 Design Flow 20000.00 37.54 71.49 52.26 71.66 0.00016 3.47 7935.39 1733.85 0.13 42.74 51.58 0.13 Lower Reach 110.7 Design Flow 20000.00 70.85 71.02 0.000148 3.44 8251.51 3260.20 Lower Reach 110.10 Design Flow 20000.00 37.30 70.45 50.68 70.53 0.000172 2.68 14620.07 3506.48 0.10 49.18 Lower Reach 109.5 Design Flow 20000.00 40.74 70.05 70.16 0.000097 2.77 10291.86 3034.28 0.10 Lower Reach 109.2 Design Flow 20000.00 39.7 69.83 50.26 69.93 0.00019 2.63 10529.08 2870.54 0.11 Lower Reach 109.1 Design Flow 20000.00 36.64 69.79 48.81 69.85 0.000100 2.42 16852.36 3357.07 0.09 Lower Reach 108.5 Design Flow 20000.00 38.94 69.47 48.43 69.55 0.000116 2.61 18285.08 6295.47 0.10 Lower Reach 107.6 Design Flow 20000.00 37.64 68.68 49.32 68.74 0.000153 2.26 20950.72 7937.46 0.10 Lower Reach 106.4 Design Flow 20000.00 35.0 67.71 46.31 67.79 0.00019 2.53 17821.47 7953.07 0.11 Lower Reach 105.3 Design Flow 20000.00 24.54 66.58 42.92 66.75 0.000171 3.43 7900.38 997.52 0.12 38.60 10486.17 Lower Reach 103.6 Design Flow 20000.00 65.67 50.41 65.78 0.000077 2.89 18426.89 0.15 47.46 Lower Reach 103.1 Design Flow 20000.00 36.14 65.53 65.59 0.000088 2.37 29761.98 9322.64 0.09 Lower Reach 102.00 Design Flow 20000.00 34.50 64.93 47.54 65.00 0.000156 2.47 20368.72 10545.02 0.10 Lower Reach 100.1 Design Flow 20000.00 36.44 63.47 45.68 63.63 0.000142 3.50 13183.56 7627.01 0.13 Lower Reach 99.51 Design Flow 20000.00 35.64 62.94 45.51 63.08 0.000185 3.28 12399.08 4315.18 0.13 Lower Reach Design Flow 20000.00 30.84 62.85 40.54 62.91 0.000114 2.14 14207.74 3931.50 0.08 Lower Reach 98.5 Design Flow 20000.00 28.40 62.49 38.92 62.51 0.00007 1.51 28115.35 7526.45 0.06 Lower Reach 97.5 Design Flow 20000.00 26.04 61.86 40.59 61.99 0.000231 3.14 8812.60 1099.68 0.12 Lower Reach 96.82 Design Flow 20000.00 30.7 61.16 41.11 61.22 0.00021 2.40 15974.16 5125.94 0.10 Lower Reach 96.805 Bridge 96.80 Design Flow 20000.00 30.7 61.12 41.11 61.18 0.000216 2.42 15775.70 5114.40 0.11 Lower Reach 94.05 Design Flow 20000.00 27.64 60.39 40.10 60.51 0.000199 3.14 13240.70 4352.93 0.12 Lower Reach 93.81 Design Flow 20000.00 27.94 60.03 40.15 60.18 0.000316 3.24 9831.70 4590.53 0.14 Lower Reach 93.8 Design Flow 20000.00 33.45 59.90 42.98 60.13 0.000406 3.98 7211.26 4077.49 0.16

 RGV

RGV

RGV-

Lower Reach

93.5

92.00

90.5

88.40

87.7

87.40

Design Flow

20000.00

20000.00

20000.00

20000.00

20000.00

20000.00

20000.00

26.74

23.60

27.04

22.00

20.54

23.30

22.54

02

55.85 55.47

59.39

58.24

57.12

56.15

55.90

39.79

37.08

36.87

35.66

33.44

35.25

2

59.58

58.28

57.27

56.17

55.94

55.86

0.00032

0.000110

0.000188

0.000074

0.000082

0.000041

3.71

2.00

3.41

1.87

2.24

1.54

8661.31

25373.53

17990.65

33676.21

22136.44

36934.72

18229.21

4238.06

7490.78

4363.90

10604.14

4230.04

8913.31

0.14

0.08

0.12

0.07

0.08

0.06

0.12

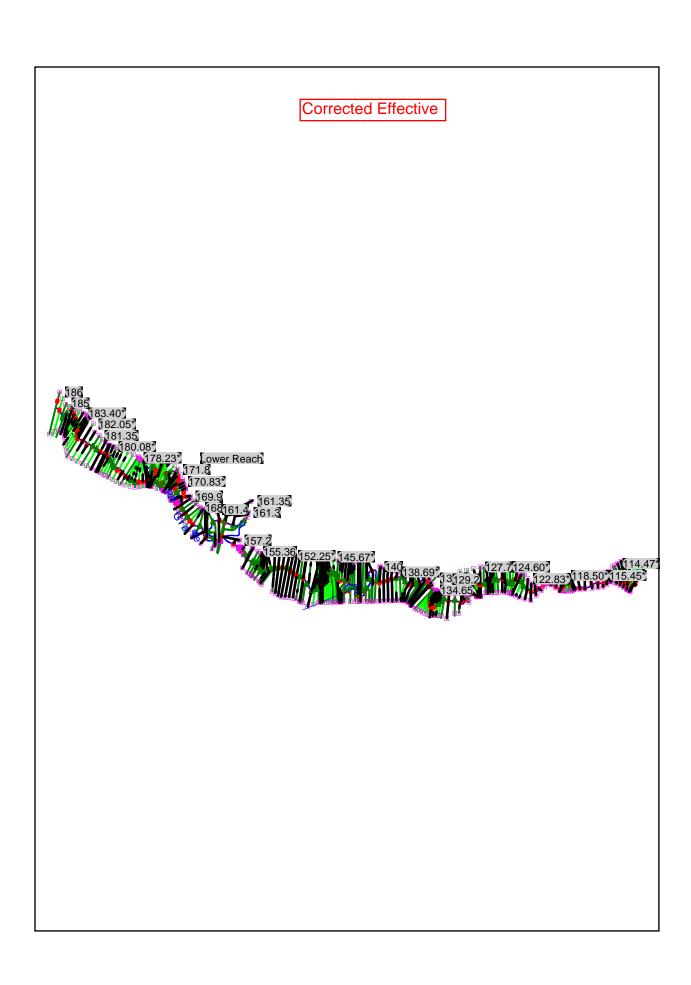
| | | tive River: Rio (| | | | n Flow (Contin | | | | | | |
|-------------|-----------|-------------------|----------|-----------|-----------|----------------|-----------|------------|----------|-----------|-----------|--------------|
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
| | 05.0 | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Lower Reach | 85.3 | Design Flow | 20000.00 | 25.50 | 55.06 | 34.17 | 55.07 | 0.000045 | 1.46 | 37197.36 | 9050.90 | 0.06 |
| Lower Reach | 84 | Design Flow | 20000.00 | 21.14 | 54.48 | 33.92 | 54.62 | 0.000258 | 3.33 | 13064.81 | 7016.25 | 0.13 |
| Lower Reach | 83.2 | Design Flow | 20000.00 | 25.20 | 54.22 | 34.64 | 54.24 | 0.000045 | 1.62 | 34967.73 | 8857.64 | 0.06 |
| Lower Reach | 82 | Design Flow | 20000.00 | 15.04 | 53.86 | 28.40 | 53.89 | 0.000096 | 1.84 | 25712.14 | 8722.08 | 0.08 |
| Lower Reach | 81.5 | Design Flow | 20000.00 | 22.44 | 53.65 | 32.87 | 53.71 | 0.000089 | 2.40 | 25160.77 | 8600.69 | 0.09 |
| Lower Reach | 79.8 | Design Flow | 20000.00 | 20.94 | 52.64 | 31.78 | 52.69 | 0.000147 | 2.31 | 19422.38 | 6271.73 | 0.10 |
| Lower Reach | 78.5 | Design Flow | 20000.00 | 15.54 | 51.41 | 31.51 | 51.49 | 0.000262 | 2.58 | 15052.86 | 6876.32 | 0.11 |
| Lower Reach | 76.70 | Design Flow | 20000.00 | 23.70 | 50.80 | 32.86 | 50.81 | 0.000046 | 1.44 | 37772.44 | 9598.11 | 0.06 |
| Lower Reach | 74.5 | Design Flow | 20000.00 | 16.74 | 50.32 | 28.88 | 50.36 | 0.000073 | 2.13 | 25314.83 | 6167.14 | 0.08 |
| Lower Reach | 73.8 | Design Flow | 20000.00 | 14.64 | 49.74 | 28.27 | 49.92 | 0.000239 | 3.58 | 8206.38 | 1922.80 | 0.14 |
| Lower Reach | 72.9 | Design Flow | 20000.00 | 14.14 | 49.05 | 28.52 | 49.10 | 0.000142 | 1.94 | 20130.67 | 5784.34 | 0.09 |
| Lower Reach | 72.2 | Design Flow | 20000.00 | 10.74 | 48.37 | 27.02 | 48.53 | 0.000170 | 3.52 | 11749.57 | 3724.92 | 0.12 |
| Lower Reach | 71.70 | Design Flow | 20000.00 | 22.50 | 47.78 | 31.29 | 47.85 | 0.000092 | 2.68 | 19431.87 | 5656.66 | 0.10 |
| Lower Reach | 70.7 | Design Flow | 20000.00 | 15.64 | 47.50 | 26.75 | 47.59 | 0.000101 | 2.82 | 13001.25 | 1959.37 | 0.10 |
| Lower Reach | 70.5 | Design Flow | 20000.00 | 12.34 | 47.32 | 26.21 | 47.46 | 0.000172 | 3.36 | 11392.55 | 2310.64 | 0.12 |
| Lower Reach | 70.2 | Design Flow | 20000.00 | 15.44 | 47.15 | 26.82 | 47.24 | 0.000114 | 3.00 | 16993.46 | 4388.43 | 0.11 |
| Lower Reach | 69.50 | Design Flow | 20000.00 | 22.90 | 46.26 | 31.88 | 46.29 | 0.000120 | 1.82 | 19662.07 | 4248.75 | 0.08 |
| Lower Reach | 67.4 | Design Flow | 20000.00 | 15.84 | 44.67 | 25.37 | 44.83 | 0.000242 | 3.18 | 6323.42 | 435.41 | 0.13 |
| Lower Reach | 67.25 | Design Flow | 20000.00 | 13.14 | 44.41 | 24.45 | 44.65 | 0.000198 | 4.02 | 5797.43 | 908.49 | 0.15 |
| Lower Reach | 66.00 | Design Flow | 20000.00 | 10.20 | 43.89 | 22.41 | 43.91 | 0.000110 | 1.74 | 29071.80 | 8436.64 | 0.07 |
| Lower Reach | 64.7 | Design Flow | 20000.00 | 11.64 | 43.30 | 22.88 | 43.41 | 0.000115 | 3.03 | 17341.66 | 5893.02 | 0.11 |
| Lower Reach | 63.8 | Design Flow | 20000.00 | 7.84 | 43.00 | 22.81 | 43.05 | 0.000070 | 2.32 | 24573.87 | 4196.19 | 0.08 |
| Lower Reach | 62.5 | Design Flow | 20000.00 | 10.24 | 42.46 | 21.45 | 42.62 | 0.000073 | 3.48 | 11649.92 | 3010.16 | 0.12 |
| Lower Reach | 62.00 | Design Flow | 20000.00 | 9.90 | 42.26 | 21.03 | 42.35 | 0.000152 | 2.61 | 13685.91 | 3428.14 | 0.10 |
| Lower Reach | 61.3 | Design Flow | 20000.00 | 3.04 | 41.71 | 19.70 | 41.78 | 0.000183 | 2.37 | 16045.09 | 4190.42 | 0.10 |
| Lower Reach | 60.60 | Design Flow | 20000.00 | 6.40 | 41.15 | 19.12 | 41.27 | 0.000108 | 3.26 | 15301.23 | 4884.58 | 0.10 |
| Lower Reach | 59.9 | Design Flow | 20000.00 | 9.14 | 40.76 | 20.11 | 40.93 | 0.000120 | 3.50 | 9829.23 | 2742.62 | 0.11 |
| Lower Reach | 59 | Design Flow | 20000.00 | 4.14 | 40.70 | 20.11 | 40.53 | 0.000070 | 3.26 | 15730.22 | 3864.21 | 0.13 |
| Lower Reach | 58.8 | Design Flow | 20000.00 | 6.64 | 40.41 | 17.62 | 40.33 | 0.000070 | 2.56 | 18611.11 | 3543.69 | 0.12 |
| Lower Reach | 58.60 | Design Flow | 20000.00 | 2.90 | 40.37 | 17.02 | 40.45 | 0.000048 | 2.46 | 14106.37 | 2209.45 | 0.09 |
| Lower Reach | 58.3 | Design Flow | 20000.00 | 5.64 | 39.99 | 17.16 | 40.16 | 0.000130 | 3.27 | 6433.68 | 406.42 | 0.03 |
| | 57.7 | _ | 20000.00 | 2.74 | 39.78 | 15.85 | 39.91 | 0.000109 | 3.05 | 10548.34 | 1517.50 | 0.13 |
| Lower Reach | | Design Flow | 20000.00 | 7.54 | | | | 0.000003 | 2.79 | | 1517.30 | 0.10 |
| | 56.9 | Design Flow | | | 39.46 | 17.55 | 39.57 | 0.000102 | | 11132.20 | | |
| Lower Reach | 56.7 | Design Flow | 20000.00 | 5.84 | 39.16 | 18.72 | 39.31 | | 3.11 | 6434.80 | 431.63 | 0.14 |
| Lower Reach | 56.1 | Design Flow | 20000.00 | 9.64 | 38.44 | 23.51 | 38.62 | 0.000322 | 3.47 | 5756.99 | 442.85 | 0.17 |
| Lower Reach | 55.5 | Design Flow | 20000.00 | 0.94 | 37.46 | 15.50 | 37.77 | 0.000256 | 4.46 | 4488.89 | 246.43 | 0.18 |
| Lower Reach | 55.25 | Design Flow | 20000.00 | 2.94 | 37.21 | 15.78 | 37.45 | 0.000136 | 4.02 | 5761.89 | 451.74 | 0.15 |
| Lower Reach | 55.23 | Design Flow | 20000.00 | -0.16 | 37.23 | 14.75 | 37.41 | 0.000100 | 3.44 | 6461.19 | 444.75 | 0.13 |
| Lower Reach | 55.215 | | Bridge | | | | | | | | | |
| Lower Reach | 55.21 | Design Flow | 20000.00 | -0.16 | 37.18 | 14.75 | 37.36 | 0.000101 | 3.45 | 6438.46 | 441.93 | 0.13 |
| Lower Reach | 55.2 | Design Flow | 20000.00 | -0.16 | 37.18 | 14.74 | 37.36 | 0.000101 | 3.45 | 6437.76 | 441.84 | 0.13 |
| Lower Reach | 54.5 | Design Flow | 20000.00 | -1.46 | 36.94 | 15.87 | 37.05 | 0.000069 | 3.13 | 9262.18 | 722.23 | 0.11 |
| Lower Reach | 54.49 | Design Flow | 20000.00 | 4.94 | 36.84 | 18.63 | 37.03 | 0.000102 | 3.78 | 6768.89 | 492.73 | 0.13 |
| Lower Reach | 54.475 | | Bridge | | | | | | | | | |
| Lower Reach | 54.47 | Design Flow | 20000.00 | 4.94 | 36.80 | 18.63 | 37.00 | 0.000103 | 3.79 | 6749.78 | 491.95 | 0.13 |
| Lower Reach | 54.46 | Design Flow | 20000.00 | 4.94 | 36.80 | 18.63 | 37.00 | 0.000103 | 3.79 | 6749.46 | 491.94 | 0.13 |
| Lower Reach | 54.45 | Design Flow | 20000.00 | 0.64 | 36.79 | 16.86 | 36.99 | 0.000092 | 3.80 | 6287.67 | 367.54 | 0.13 |
| Lower Reach | 54.435 | | Bridge | | | | | | | | | |
| Lower Reach | 54.43 | Design Flow | 20000.00 | 0.64 | 36.74 | 16.86 | 36.95 | 0.000093 | 3.81 | 6270.75 | 367.36 | 0.13 |
| Lower Reach | 54.42 | Design Flow | 20000.00 | 0.64 | 36.74 | 16.86 | 36.95 | 0.000093 | 3.81 | 6270.40 | 367.36 | 0.13 |
| Lower Reach | 54.4 | Design Flow | 20000.00 | -0.36 | 36.73 | 15.09 | 36.92 | 0.000116 | 3.59 | 6089.75 | 398.74 | 0.13 |
| Lower Reach | 54 | Design Flow | 20000.00 | 3.94 | 36.41 | 16.07 | 36.64 | 0.000099 | 4.09 | 6556.82 | 681.90 | 0.14 |
| Lower Reach | 53.2 | Design Flow | 20000.00 | 1.40 | 35.81 | 13.63 | 35.98 | 0.000291 | 3.42 | 9508.00 | 4281.67 | 0.13 |
| Lower Reach | 52.4 | Design Flow | 20000.00 | -0.76 | 35.22 | 15.73 | 35.34 | 0.000095 | 3.14 | 11117.05 | 1519.27 | 0.12 |
| Lower Reach | 51.6 | Design Flow | 20000.00 | 4.64 | 34.66 | 16.40 | 34.82 | 0.000147 | 3.49 | 10088.77 | 2572.03 | 0.14 |
| Lower Reach | 51.51 | Design Flow | 20000.00 | 4.30 | 34.53 | 15.65 | 34.66 | 0.000291 | 2.97 | 9095.23 | 3312.63 | 0.12 |
| Lower Reach | 51.42 | Design Flow | 20000.00 | 4.88 | 34.55 | 13.79 | 34.58 | 0.000040 | 1.77 | 20062.11 | 3927.24 | 0.07 |
| Lower Reach | 51.405 | | Bridge | | | | | | | | | |
| Lower Reach | 51.40 | Design Flow | 20000.00 | 4.88 | 34.54 | 13.79 | 34.57 | 0.000040 | 1.76 | 20469.57 | 3927.18 | 0.07 |
| Lower Reach | 50.8 | Design Flow | 20000.00 | 1.94 | 34.31 | 14.98 | 34.38 | 0.000103 | 2.34 | 17417.76 | 4997.27 | 0.11 |
| Lower Reach | 49.6 | Design Flow | 20000.00 | -1.96 | 33.82 | 12.07 | 33.90 | 0.000079 | 2.53 | 17464.73 | 5456.35 | |
| Lower Reach | 49.00 | Design Flow | 20000.00 | 1.22 | 33.29 | 14.21 | 33.40 | 0.000346 | 2.87 | 9182.04 | 6004.69 | 0.13 |
| Lower Reach | 48.4 | Design Flow | 20000.00 | 0.64 | 32.39 | 13.90 | 32.56 | 0.000171 | 3.42 | 9320.14 | 3657.97 | 0.15 |
| Lower Reach | 47.9 | Design Flow | 20000.00 | 5.24 | 32.05 | 14.24 | 32.26 | 0.000171 | 3.68 | 7150.60 | 2303.93 | 0.16 |
| Lower Reach | 47.8 | Design Flow | 20000.00 | 9.04 | 31.99 | 17.08 | 32.22 | 0.000169 | 3.97 | 6544.06 | 2300.00 | 0.19 |
| Lower Reach | 47.7 | Design Flow | 20000.00 | -0.26 | 31.84 | 12.55 | 32.05 | 0.000203 | 3.69 | 6732.05 | 2289.81 | 0.15 |
| Lower Reach | 47.55 | Design Flow | 20000.00 | -2.90 | 31.79 | 6.79 | 31.86 | 0.000184 | 2.27 | 14903.71 | 3926.10 | 0.10 |
| Lower Reach | 47.4 | Design Flow | 20000.00 | -3.66 | 31.63 | 10.65 | 31.75 | 0.000039 | 2.80 | 8992.92 | 3354.80 | 0.10 |
| Lower Reach | 47.10 | Design Flow | 20000.00 | -4.30 | 31.56 | 7.88 | 31.75 | 0.000081 | 2.60 | 14031.07 | 3970.28 | 0.14 |
| | 46.8 | | | | | 10.24 | | 0.000050 | 3.22 | | 3970.28 | |
| Lower Reach | | Design Flow | 20000.00 | -3.16 | 31.35 | | 31.51 | | | 7870.64 | | |
| Lower Reach | 46.4 | Design Flow | 20000.00 | -1.16 | 30.55 | 12.28 | 30.79 | 0.000340 | 3.94 | 5077.31 | 385.67 | 0.19 |
| Lower Reach | 45.7 | Design Flow | 20000.00 | -5.30 | 30.37 | 7.39 | 30.48 | 0.000041 | 2.77 | 16927.25 | 3924.78 | 0.11 |
| Lower Reach | 45 | Design Flow | 20000.00 | -10.16 | 30.17 | 7.18 | 30.28 | 0.000114 | 2.71 | 7769.70 | 678.00 | 0.12 |
| Lower Reach | 44 | Design Flow | 20000.00 | -4.06 | 29.24 | 9.79 | 29.51 | 0.000215 | 4.23 | 5182.53 | 774.76 | |
| Lower Reach | 43.2 | Design Flow | 20000.00 | -4.60 | 28.48 | 7.85 | 28.60 | 0.000194 | 2.97 | 9882.20 | 5945.05 | |
| Lower Reach | 42.4 | Design Flow | 20000.00 | -4.36 | 27.33 | 9.10 | 27.63 | 0.000260 | 4.40 | 4682.48 | 439.34 | 0.19 |
| Lower Reach | 42 | Design Flow | 20000.00 | -2.70 | 27.24 | 6.55 | 27.29 | 0.000085 | 2.25 | 22639.56 | 7661.62 | 0.09 |
| Lower Reach | 40.3 | Design Flow | 20000.00 | -6.26 | 25.98 | 7.89 | 26.13 | 0.000279 | 3.29 | 8113.19 | 1775.26 | |
| Lower Reach | 39.8 | Design Flow | 20000.00 | -5.42 | 25.24 | 5.63 | 25.39 | 0.000257 | 3.05 | 7718.30 | 5107.72 | 0.13 |

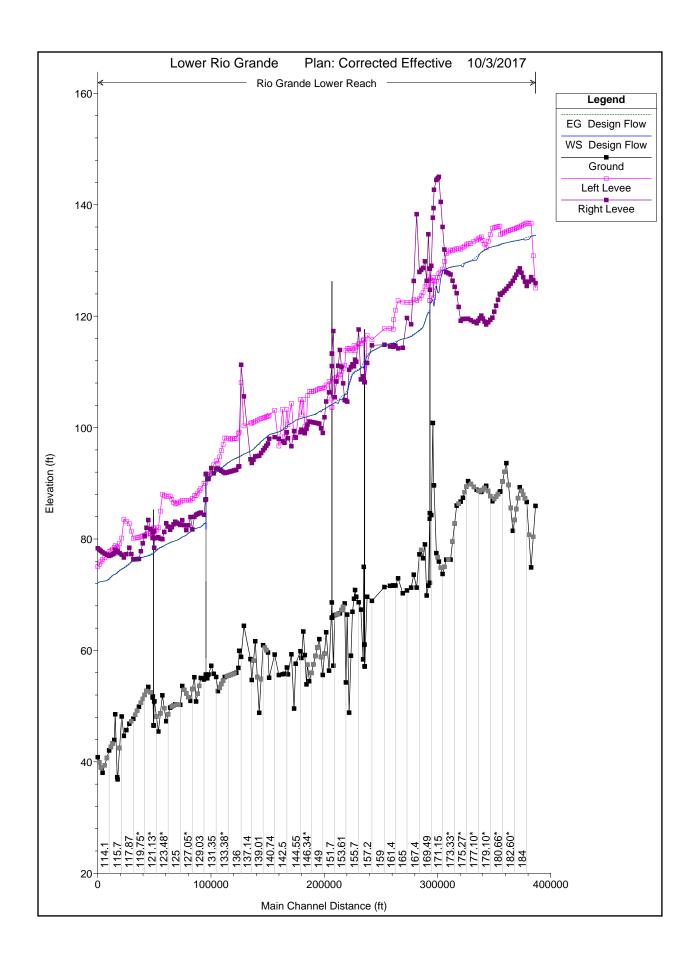
HEC-RAS Plan: Duplicate Effective River: Rio Grande Reach: Lower Reach Profile: Design Flow (Continued)

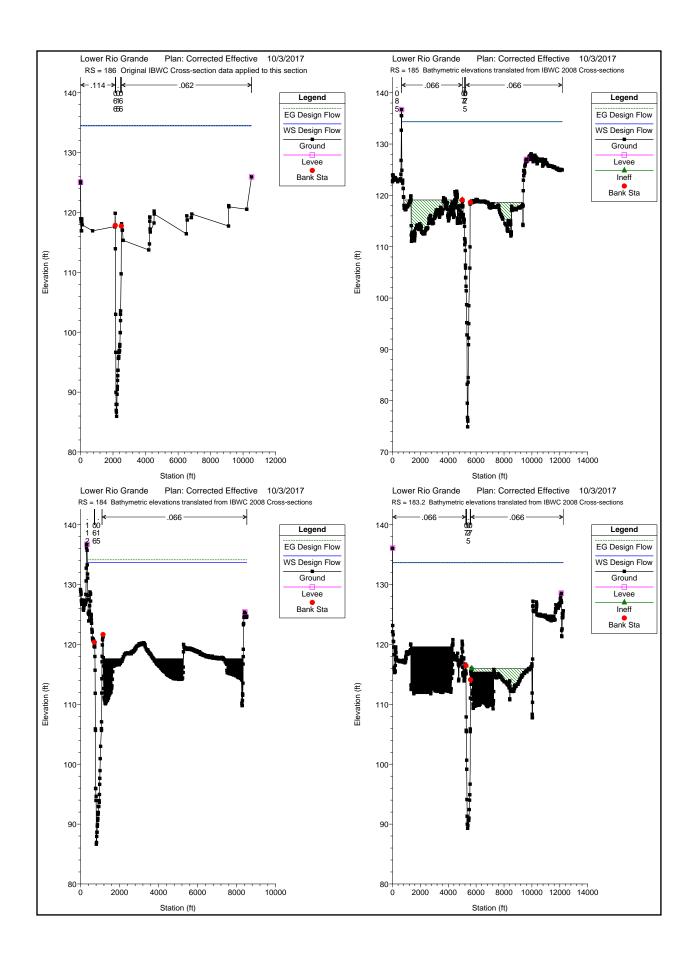
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|-------------|-----------|-------------|----------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Lower Reach | 38.9 | Design Flow | 20000.00 | -8.16 | 24.35 | 7.39 | 24.53 | 0.000143 | 3.52 | 6808.01 | 631.49 | 0.14 |
| Lower Reach | 37.6 | Design Flow | 20000.00 | -5.98 | 23.61 | 5.47 | 23.66 | 0.000102 | 1.98 | 13910.28 | 6571.07 | 0.08 |
| Lower Reach | 36.3 | Design Flow | 20000.00 | -7.16 | 22.43 | 5.25 | 22.72 | 0.000169 | 4.43 | 4935.70 | 395.80 | 0.18 |
| Lower Reach | 34.9 | Design Flow | 20000.00 | -4.60 | 21.35 | 5.33 | 21.40 | 0.000202 | 2.31 | 17921.53 | 3533.59 | 0.11 |
| Lower Reach | 34 | Design Flow | 20000.00 | -8.16 | 20.00 | 4.20 | 20.29 | 0.000303 | 4.38 | 4563.57 | 320.12 | 0.20 |
| Lower Reach | 32.10 | Design Flow | 20000.00 | -9.40 | 18.50 | 4.32 | 18.64 | 0.000107 | 2.95 | 6790.41 | 2795.96 | 0.15 |
| Lower Reach | 31.2 | Design Flow | 20000.00 | -8.96 | 17.46 | 3.88 | 17.92 | 0.000229 | 5.50 | 3877.72 | 309.79 | 0.23 |
| Lower Reach | 29.6 | Design Flow | 20000.00 | -5.30 | 14.70 | 4.36 | 15.05 | 0.000553 | 4.74 | 4216.06 | 1595.27 | 0.23 |
| Lower Reach | 28 | Design Flow | 20000.00 | -6.66 | 5.52 | 3.02 | 7.66 | 0.001502 | 11.74 | 1703.80 | 173.23 | 0.66 |

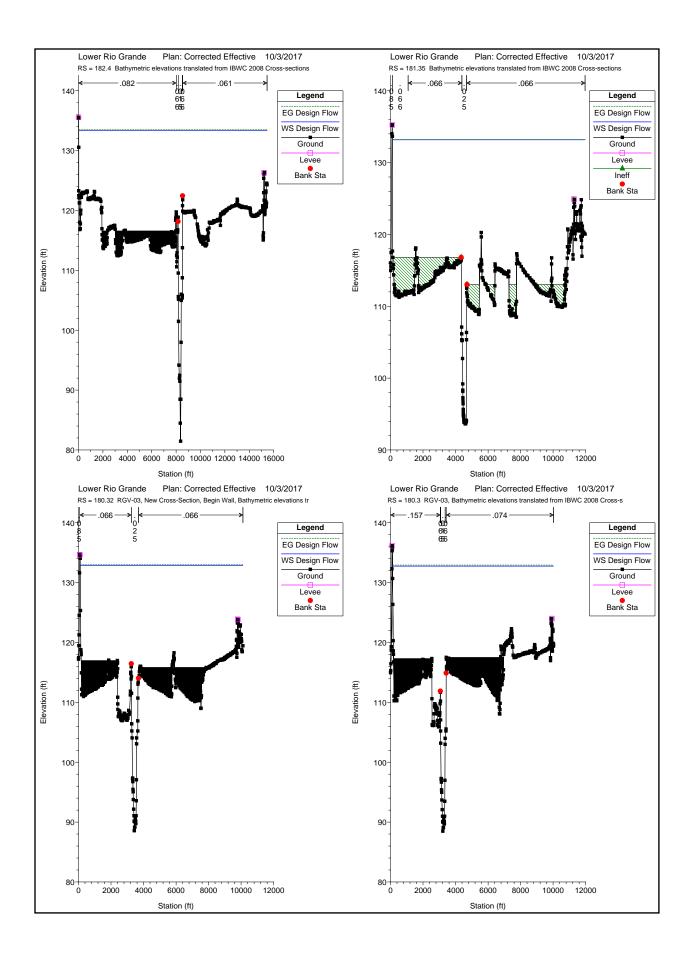


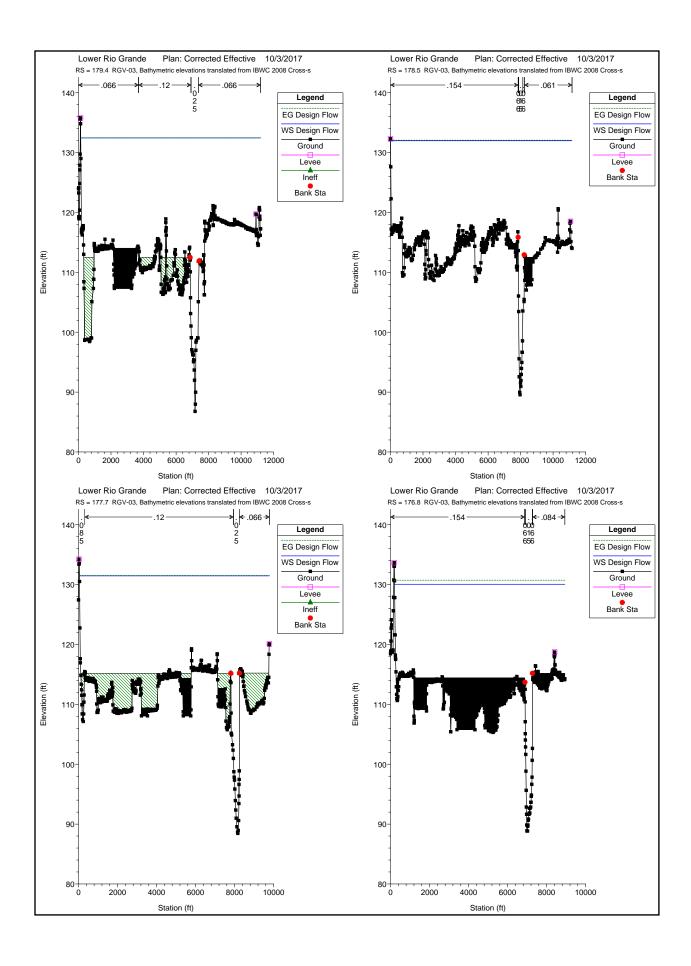
| ➤ Penitas to Hidalgo-Cameron County Line Corrected Effective HEC-RAS Model |
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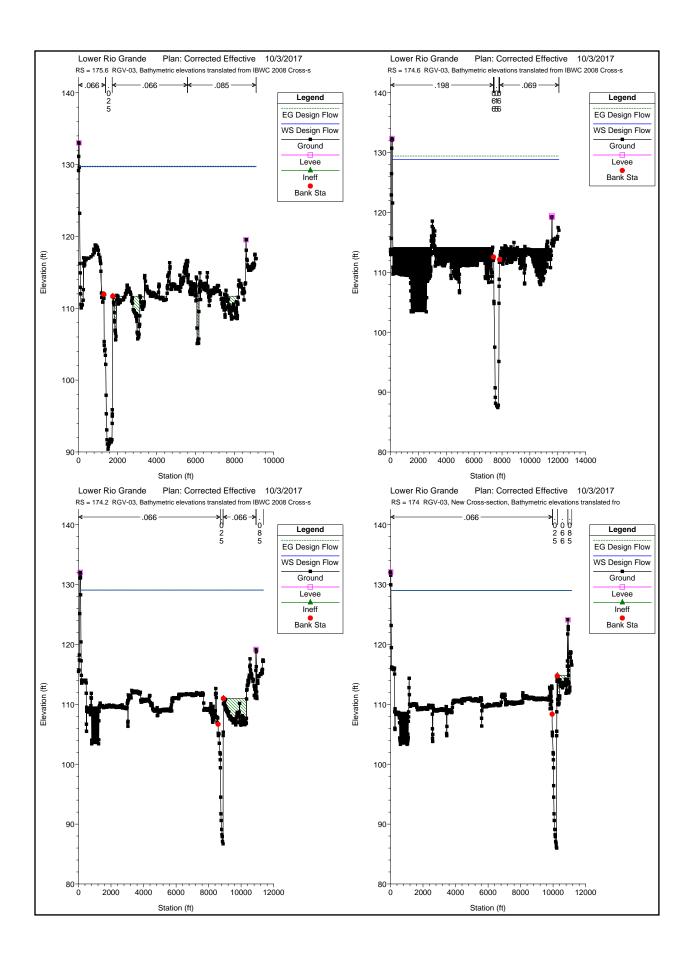


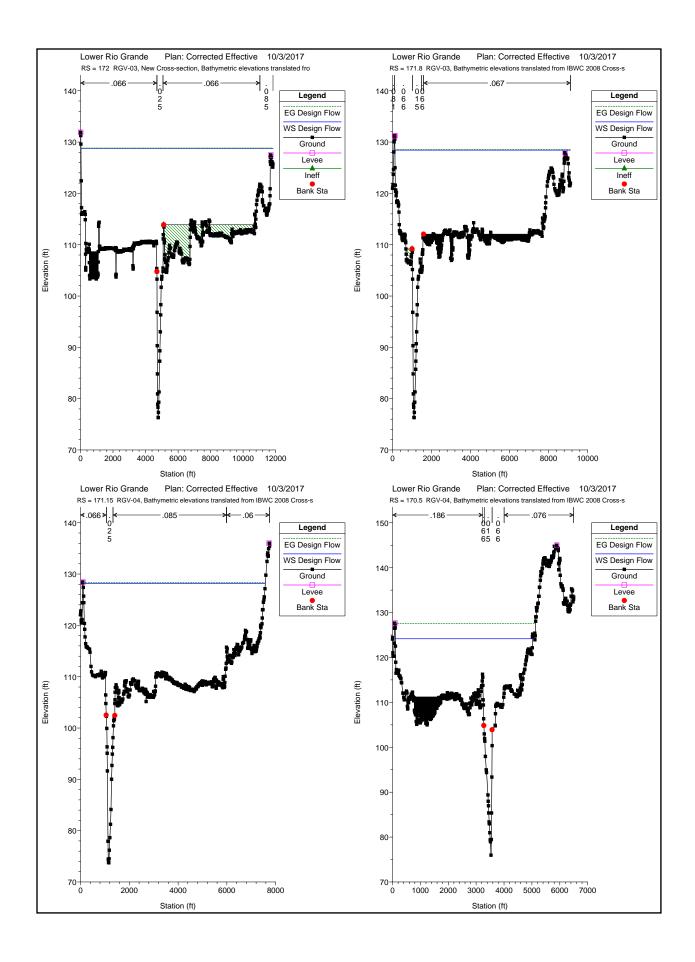


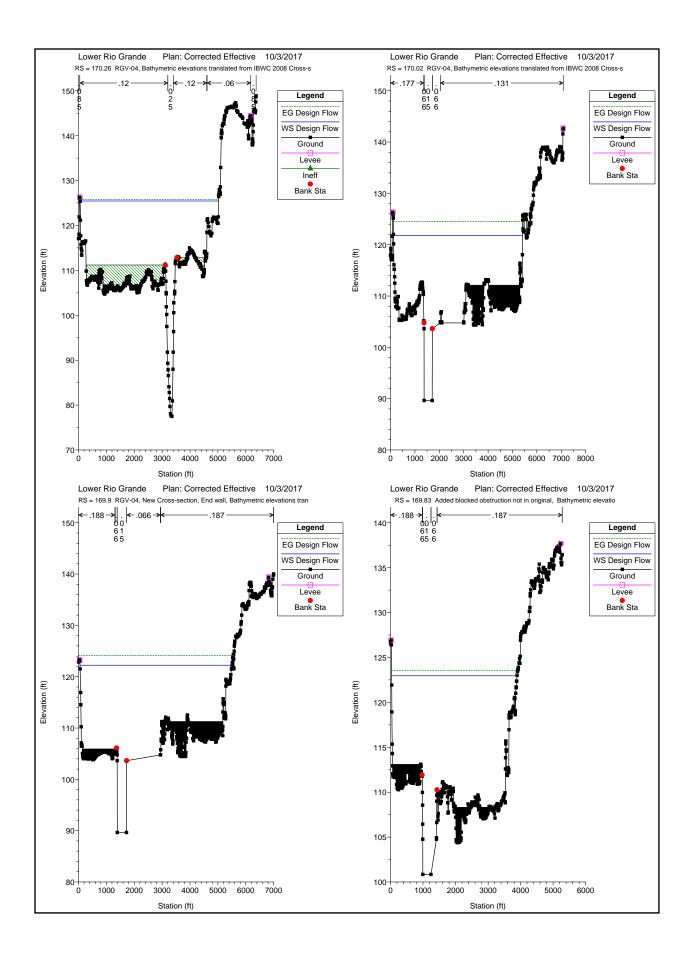


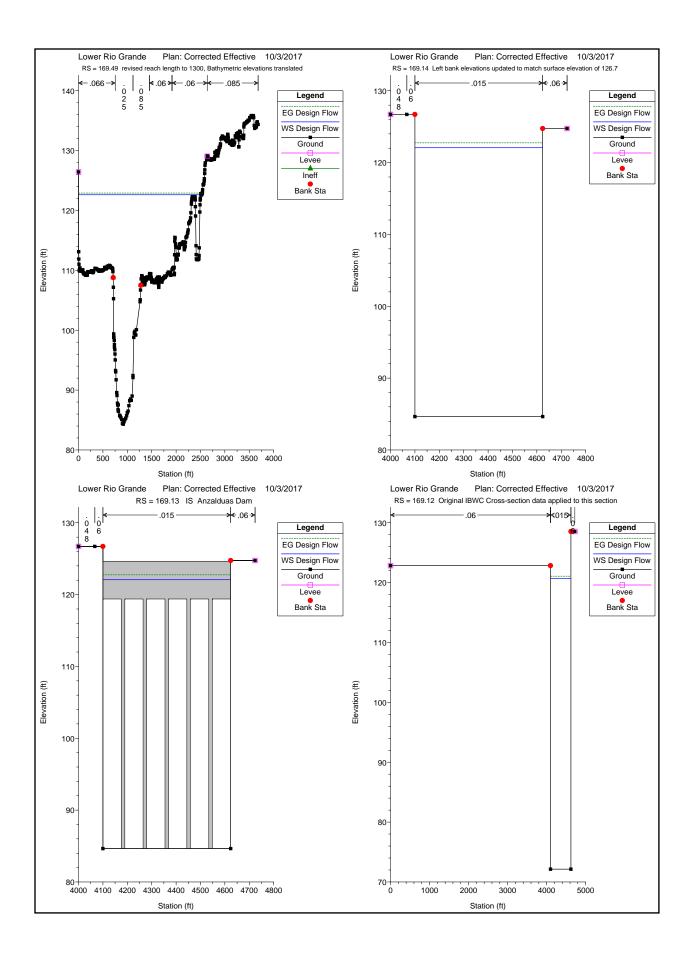


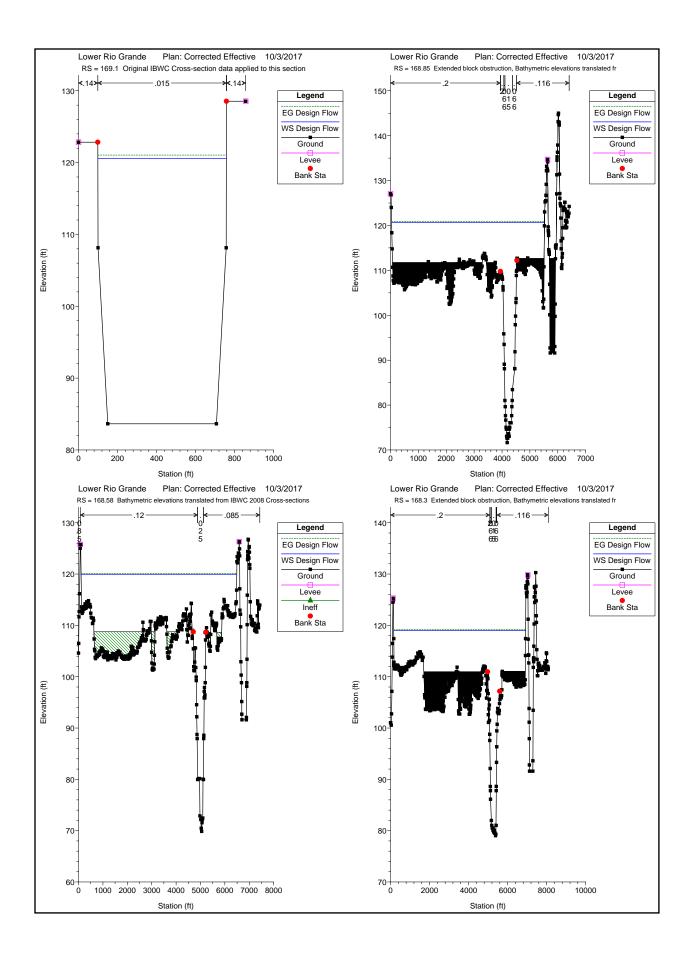


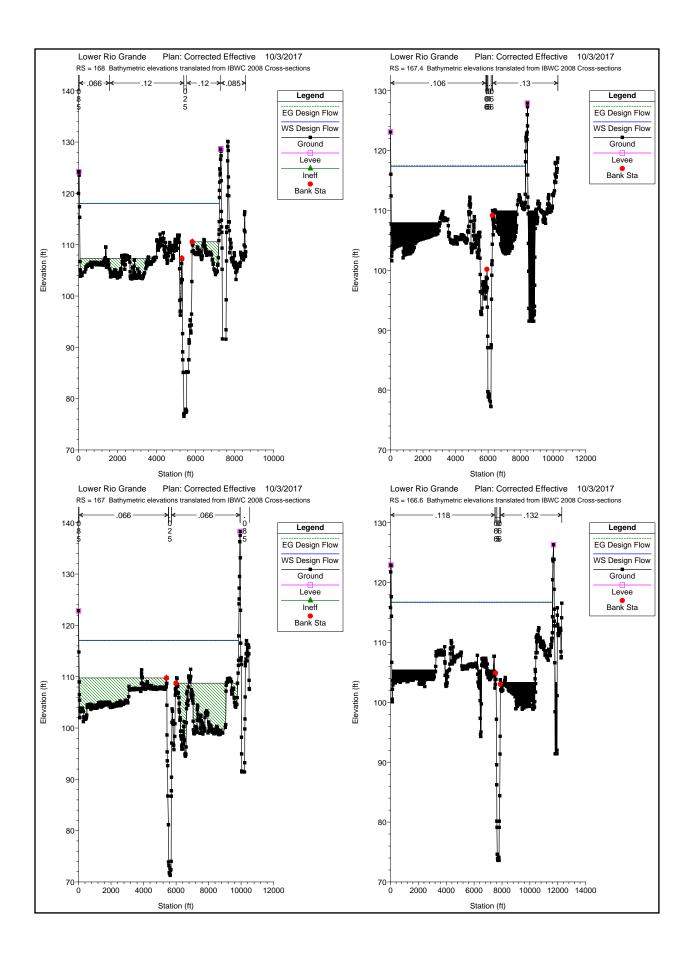


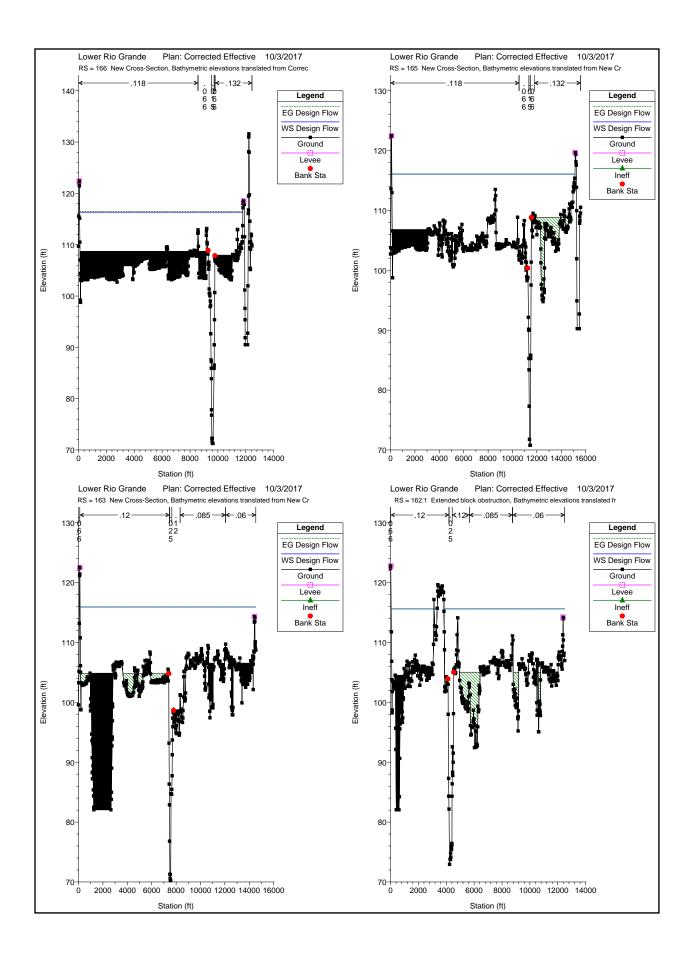


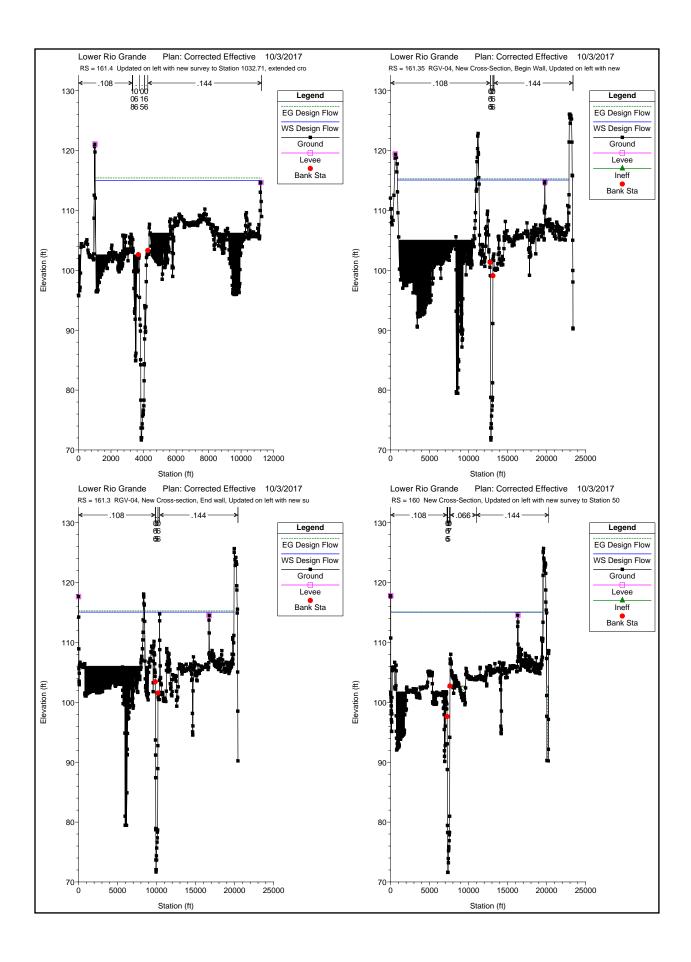


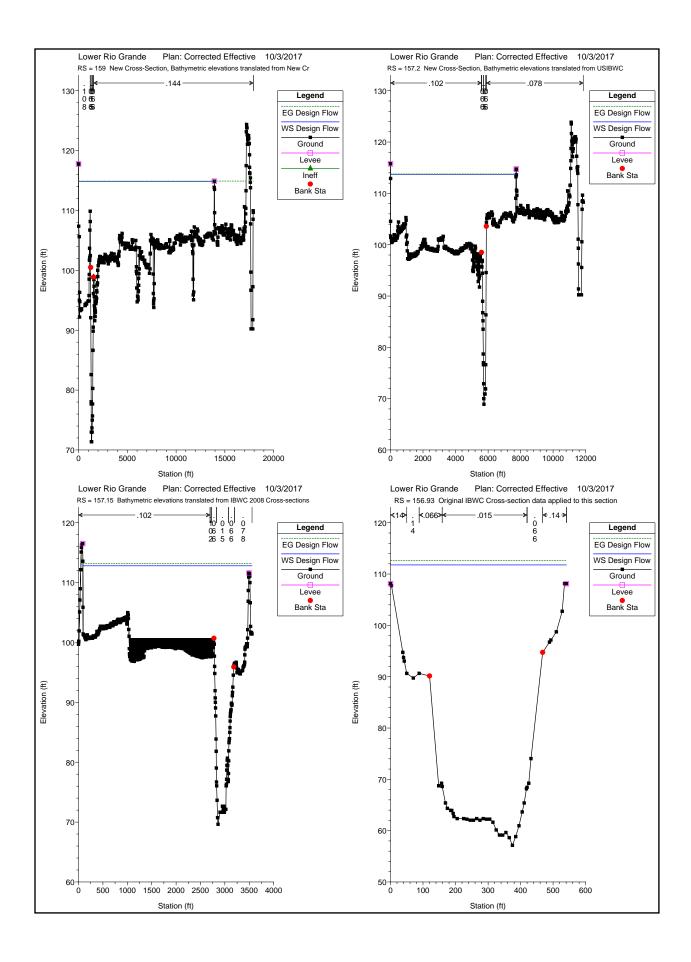


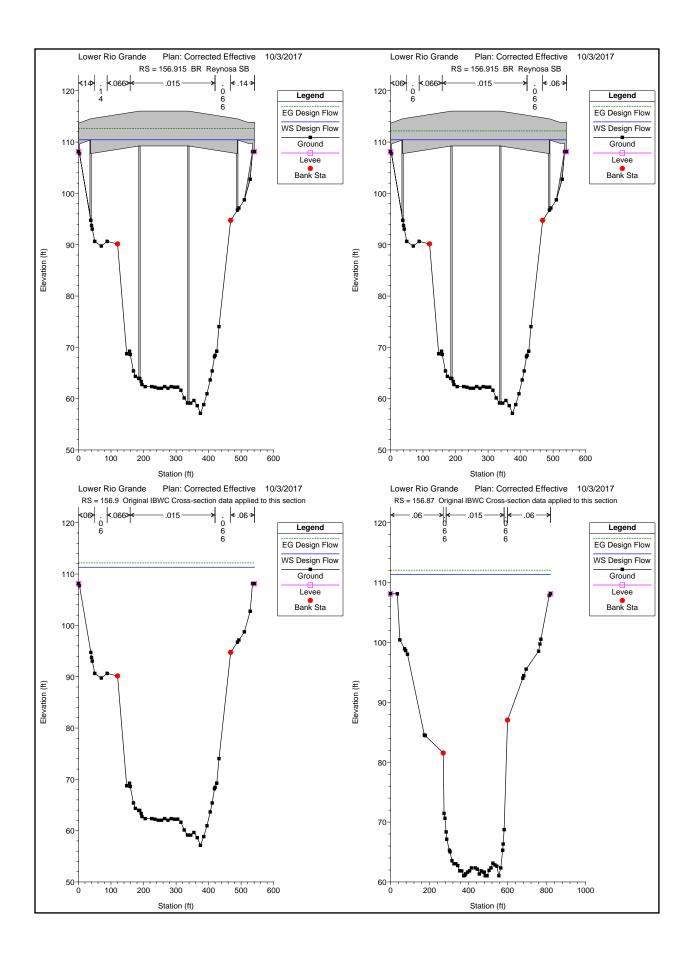


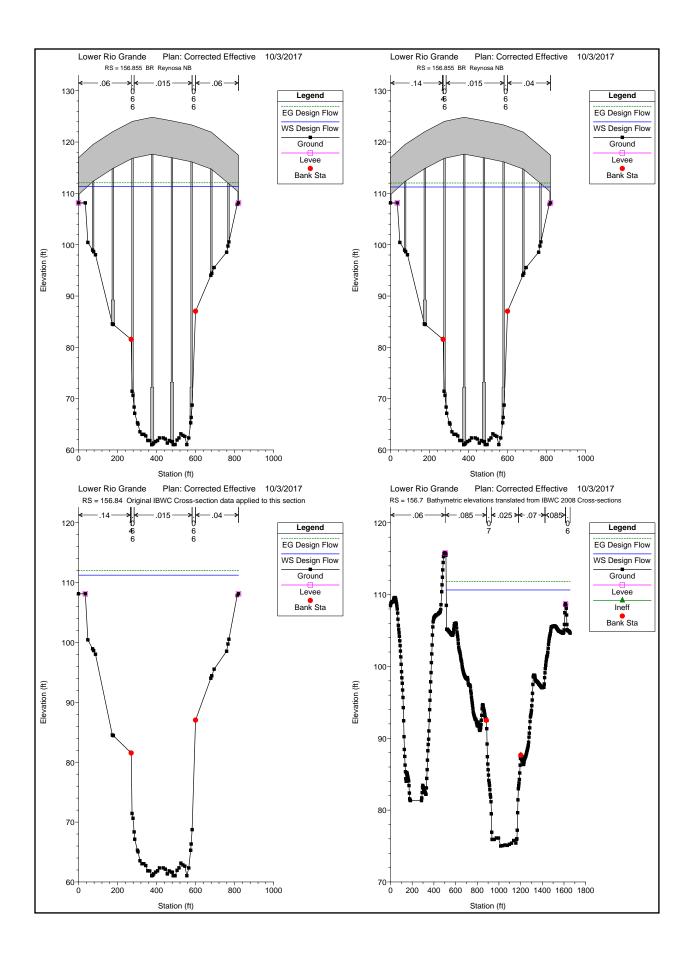


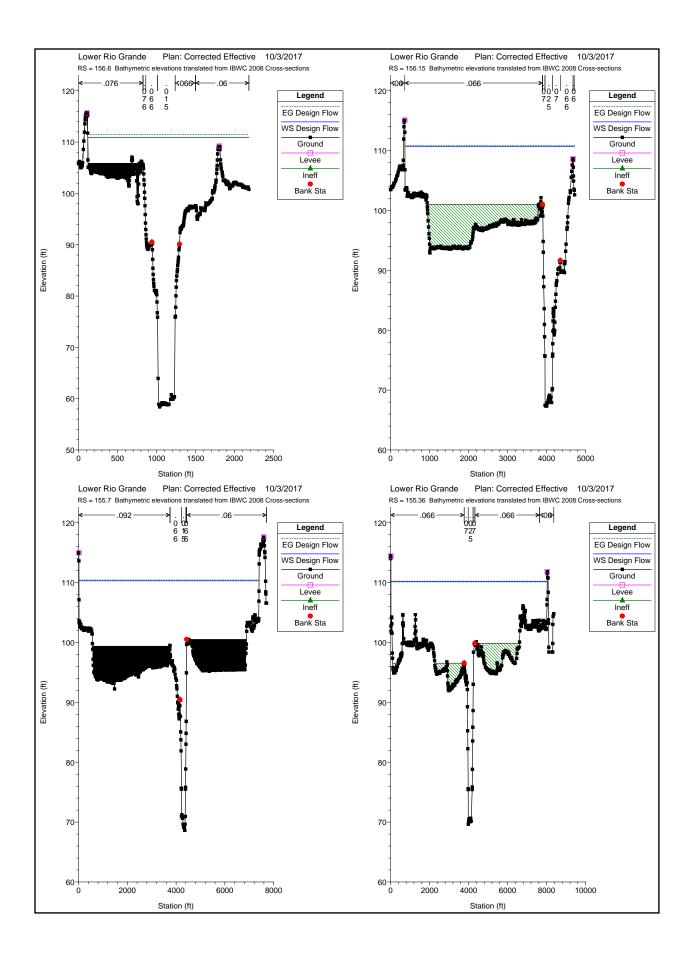


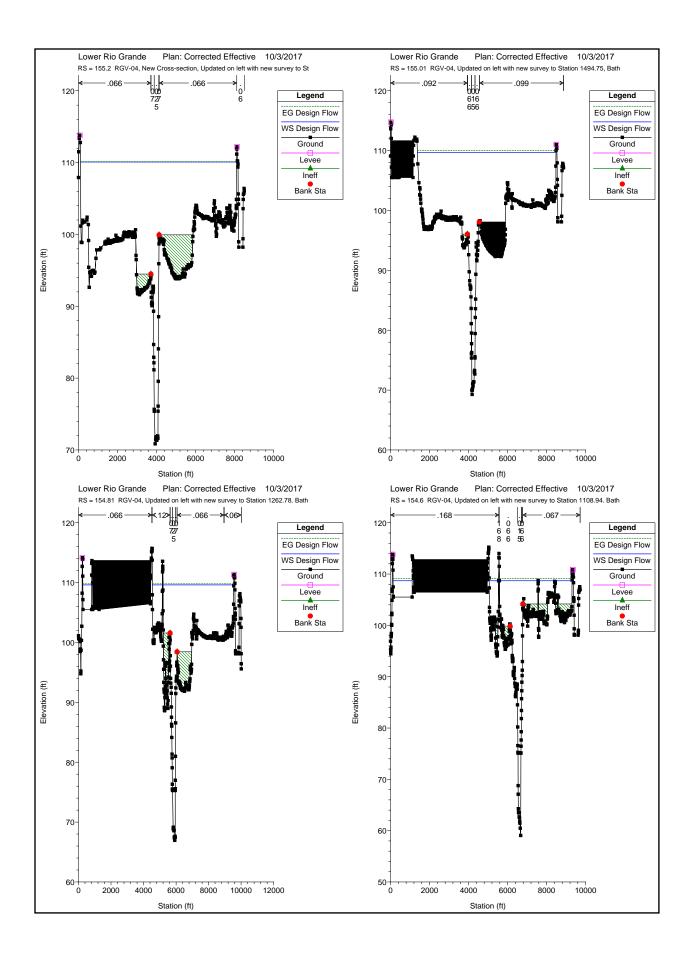


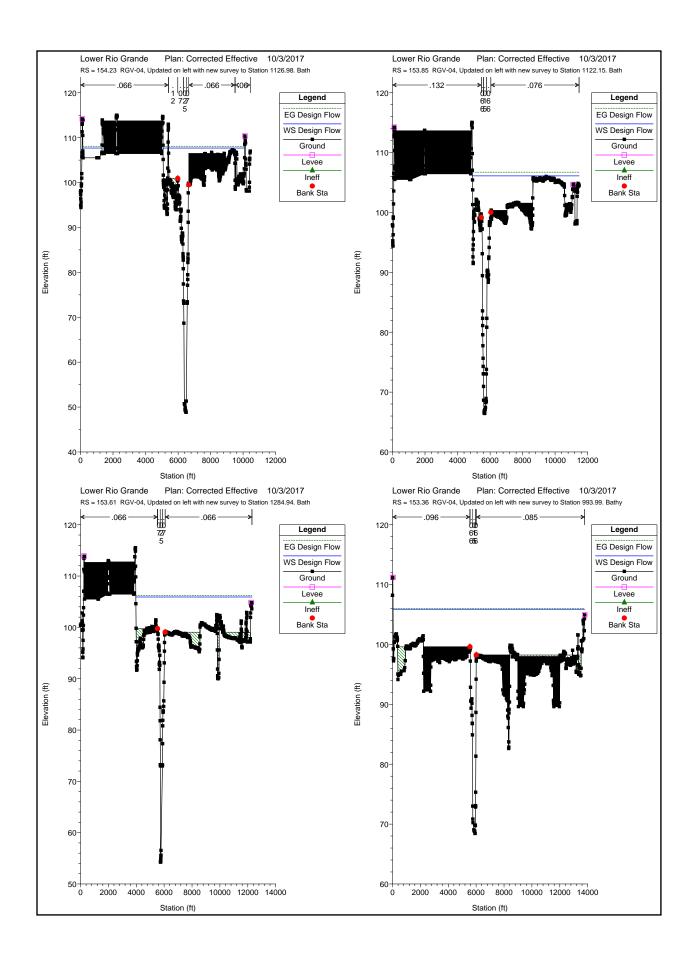


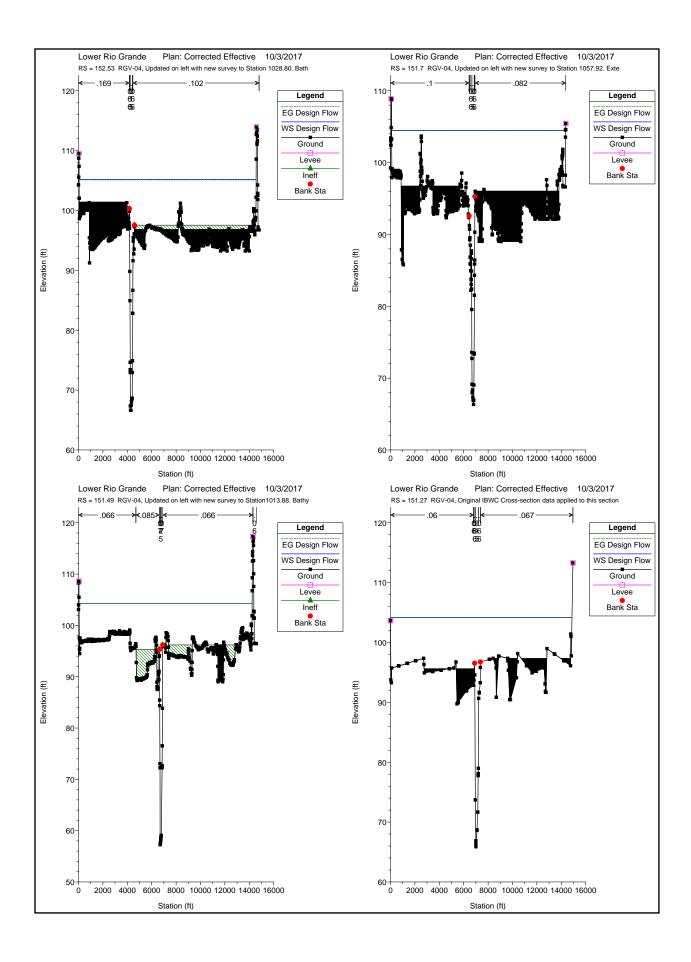


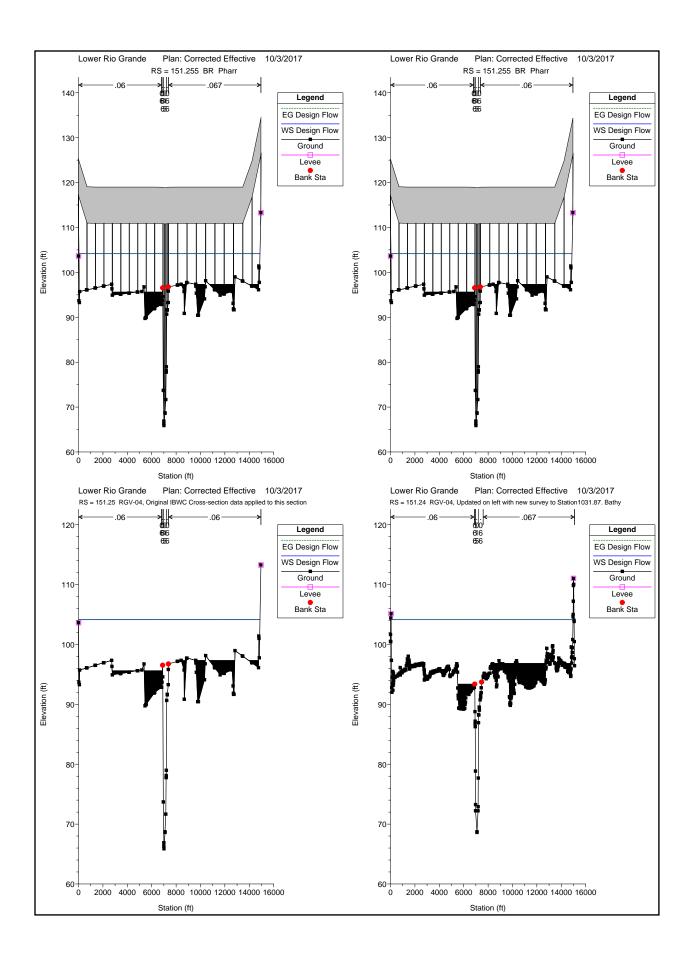


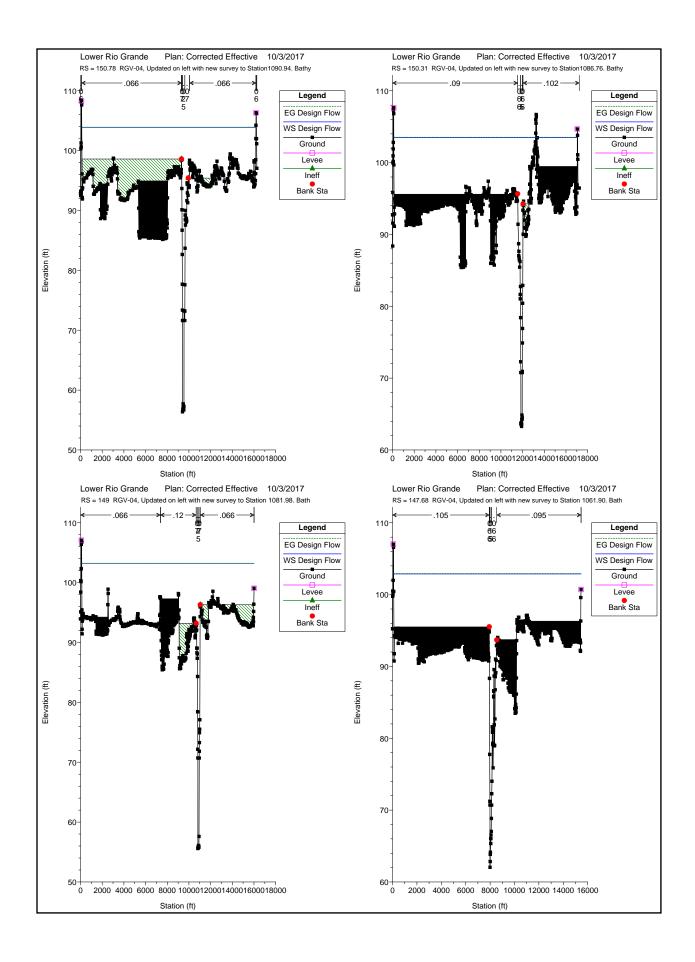


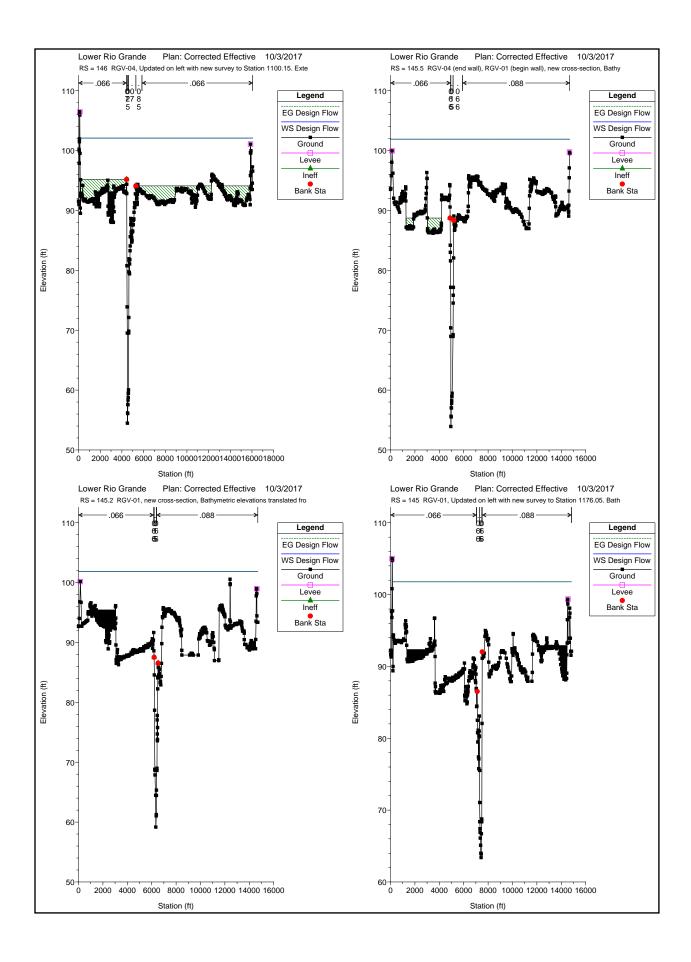


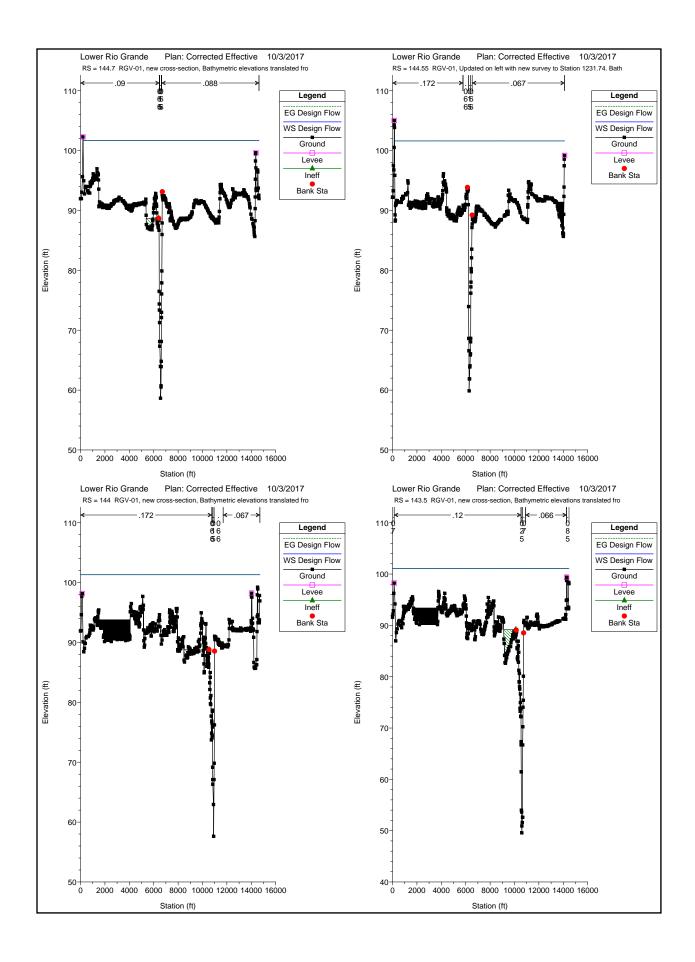


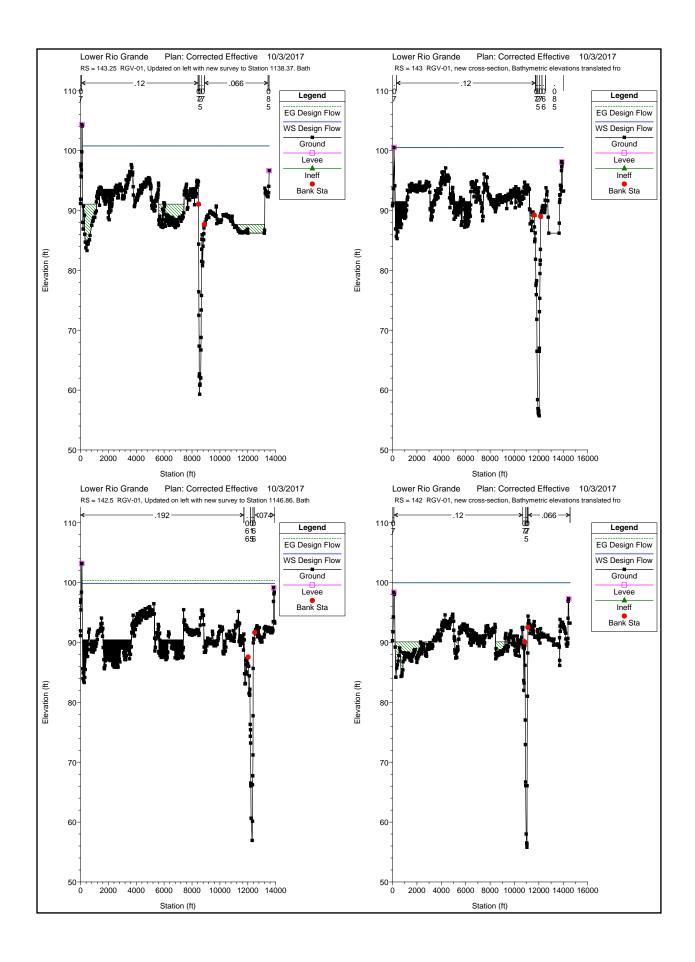


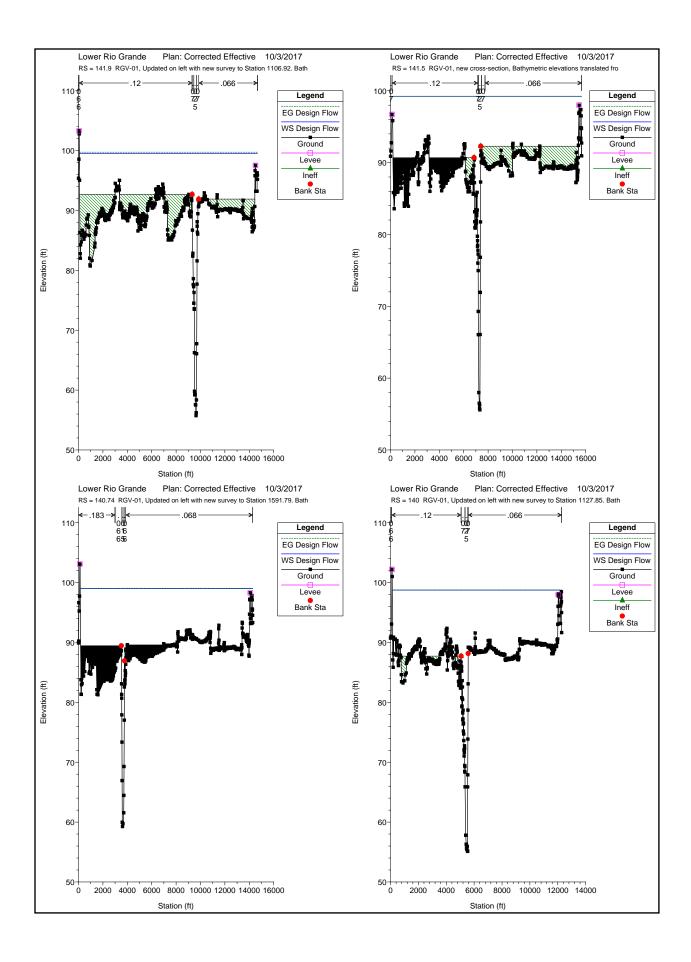


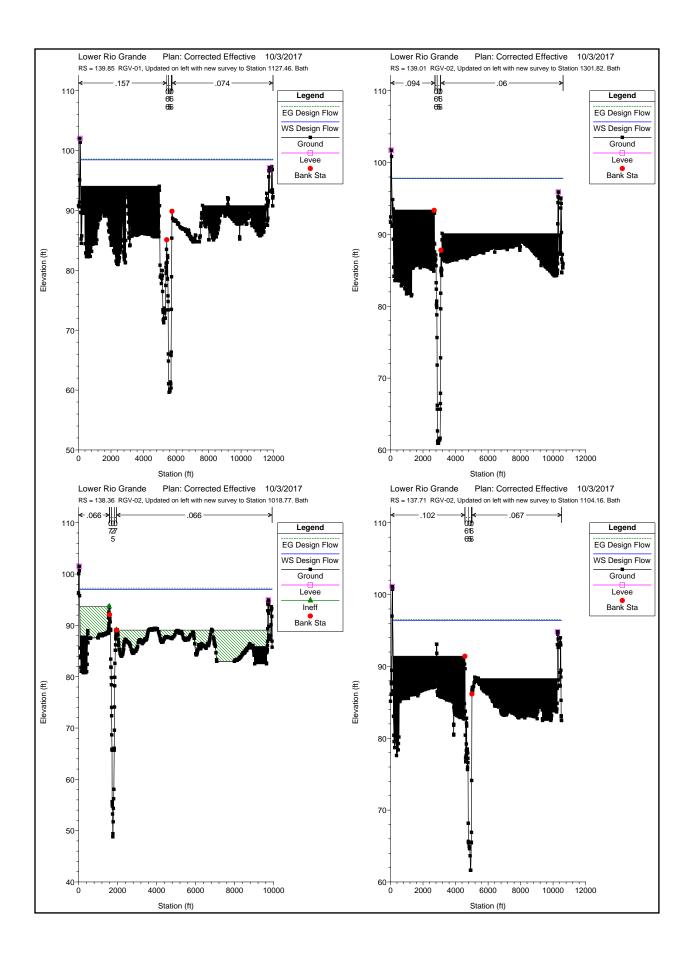


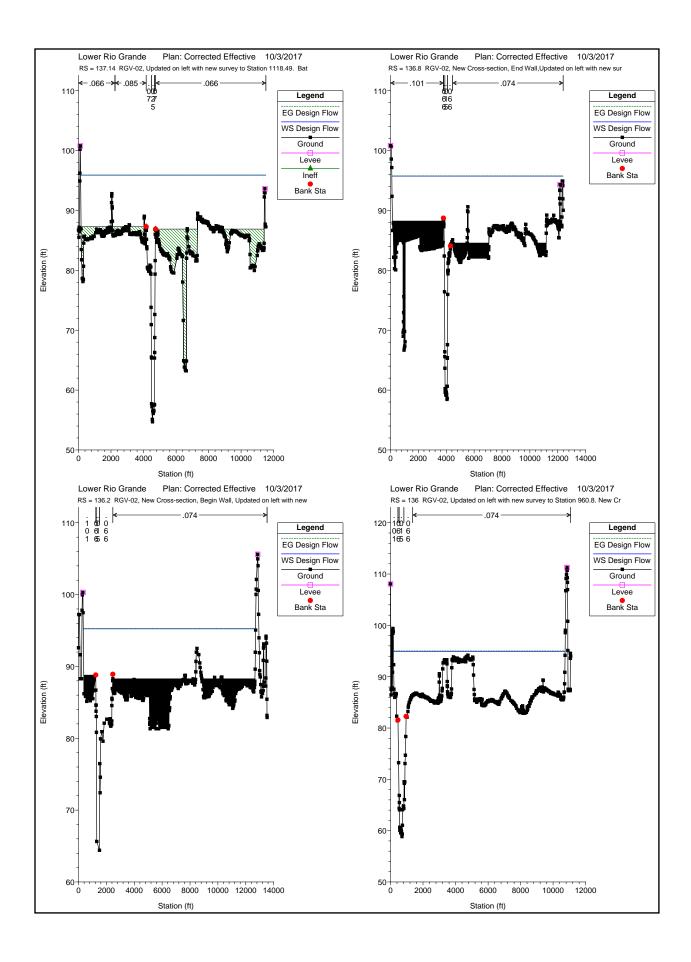


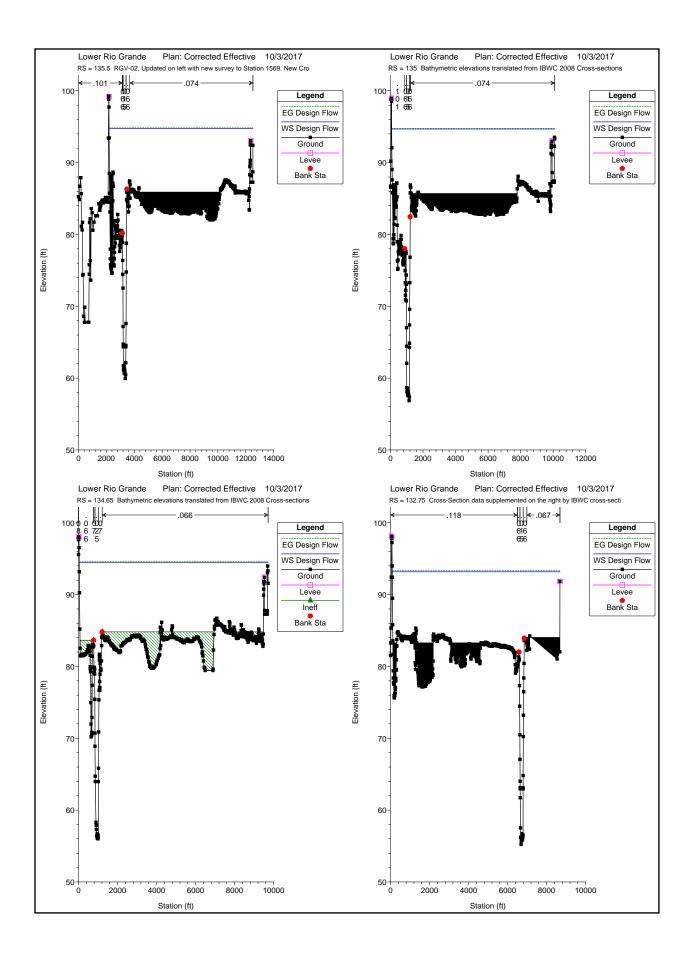


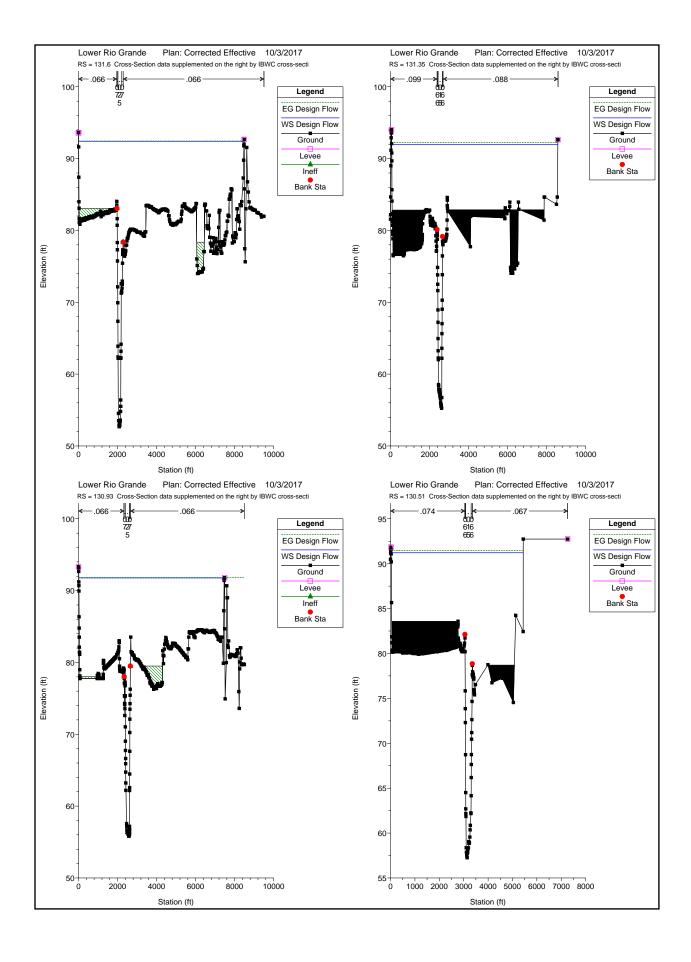


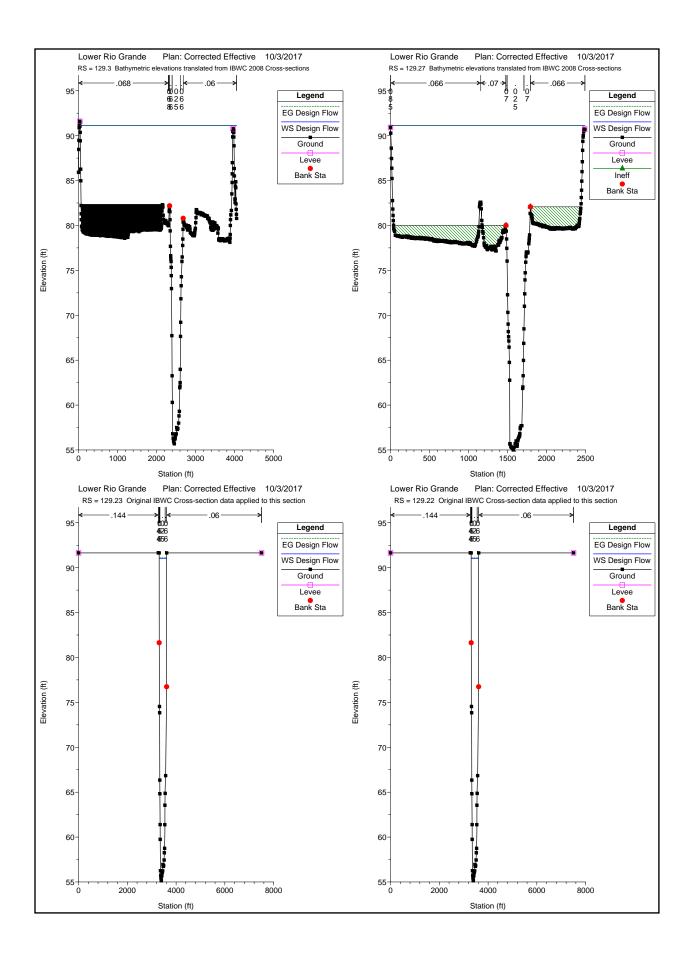


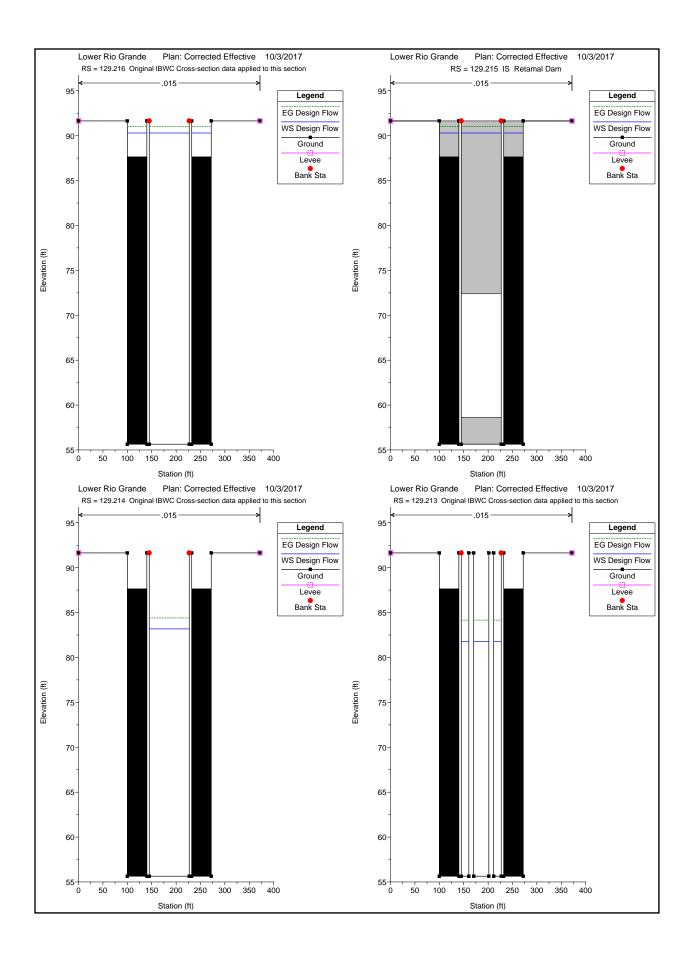


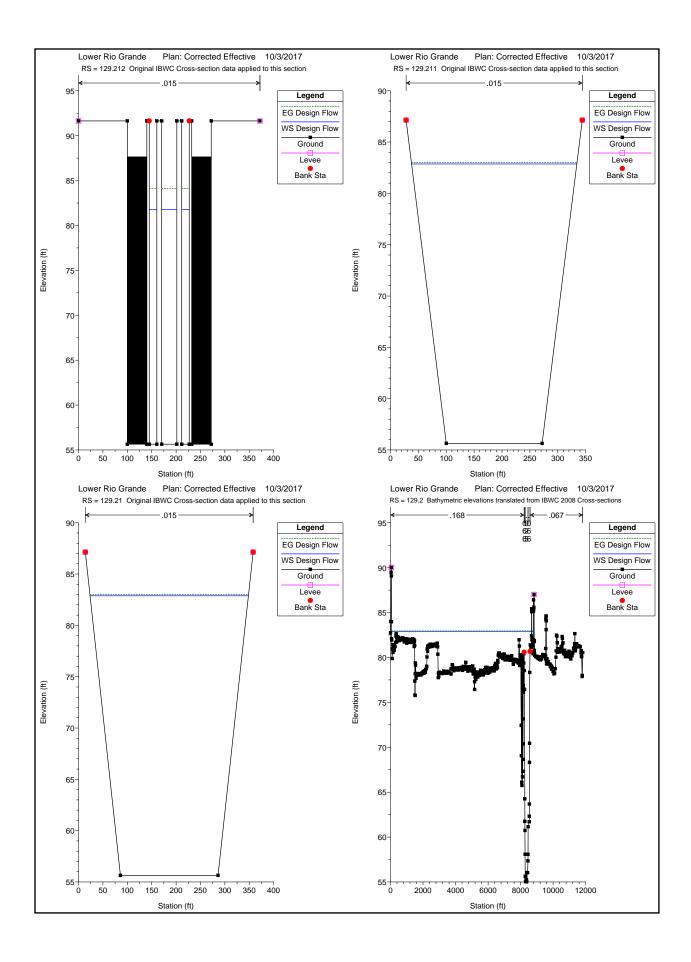


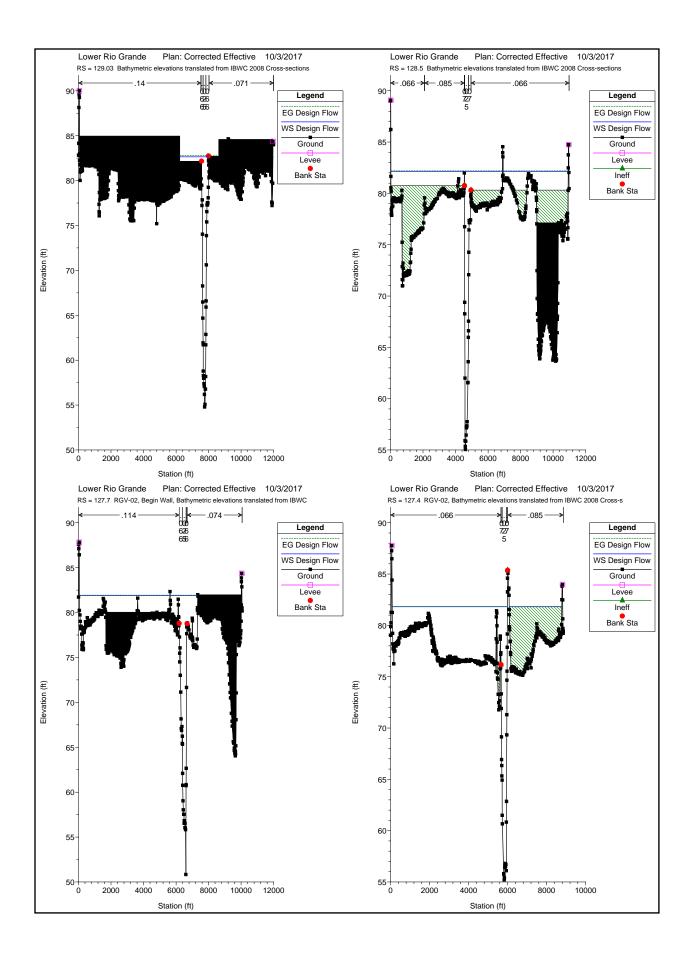


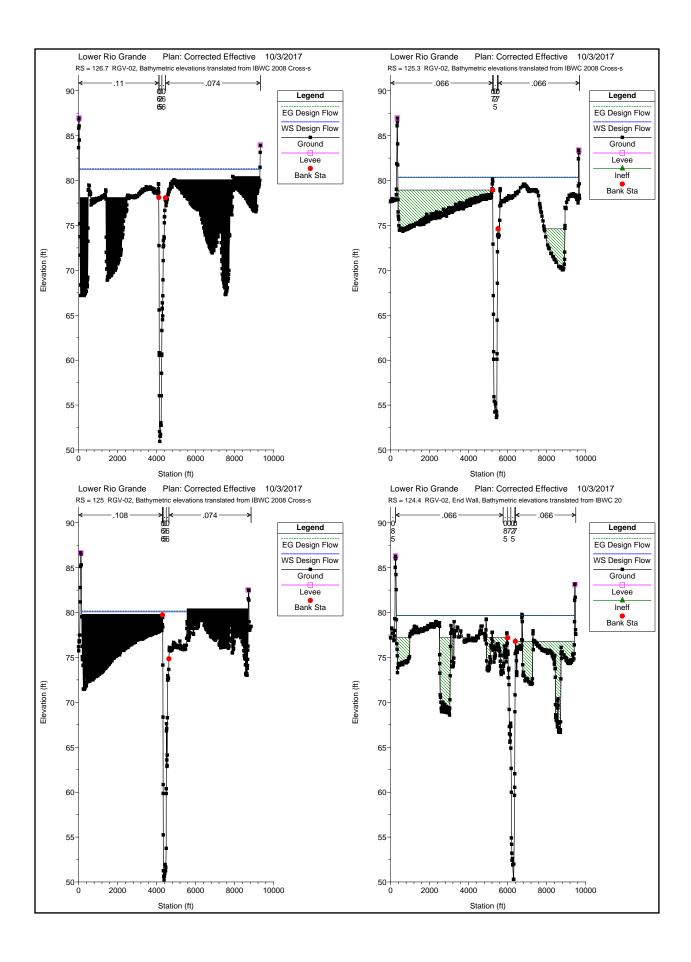


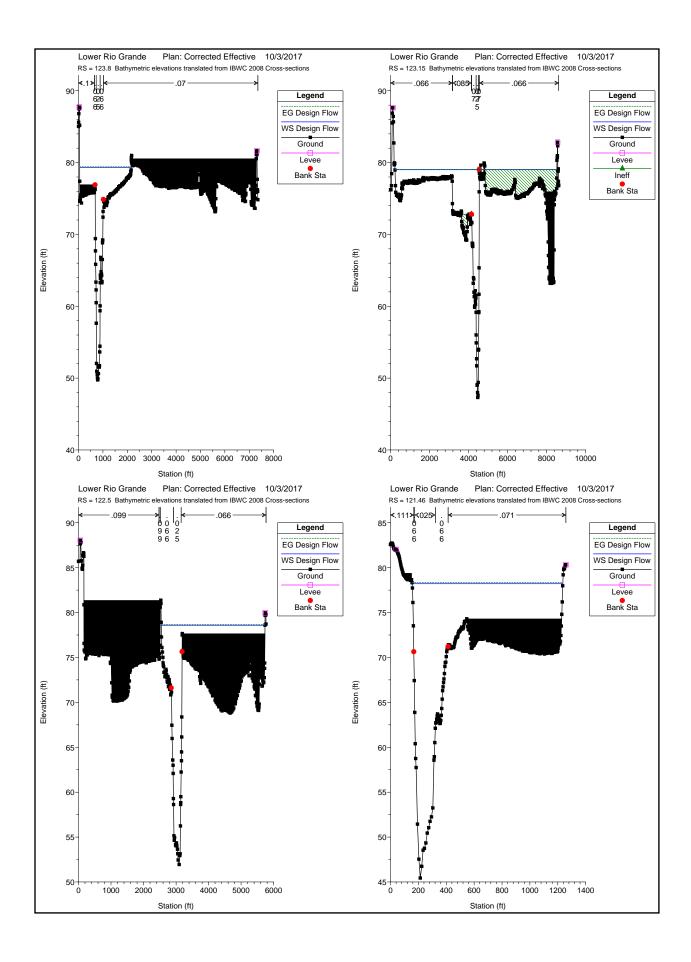


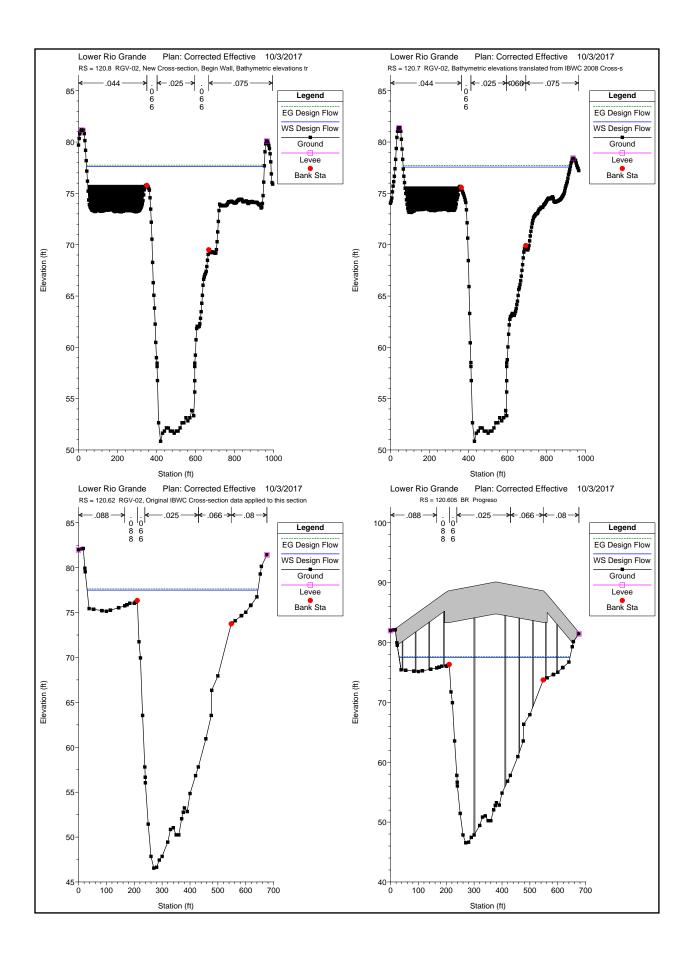


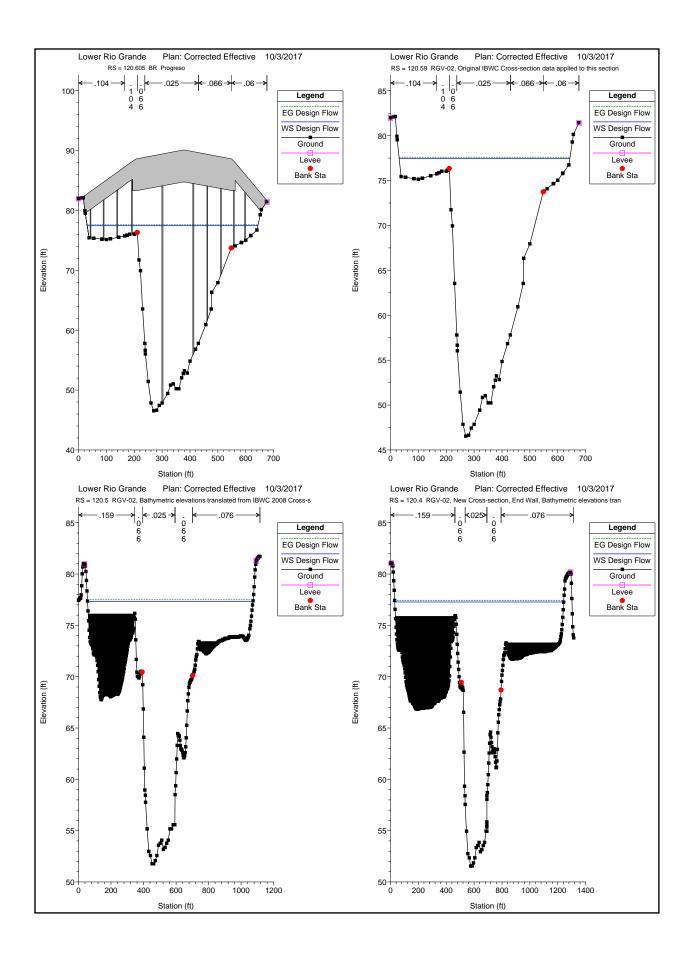


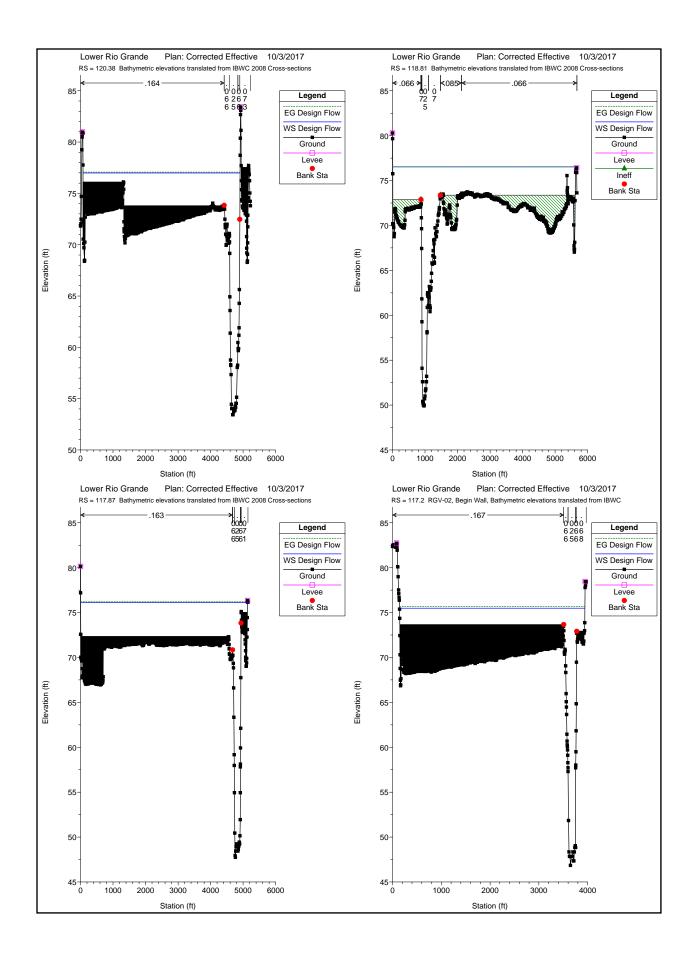


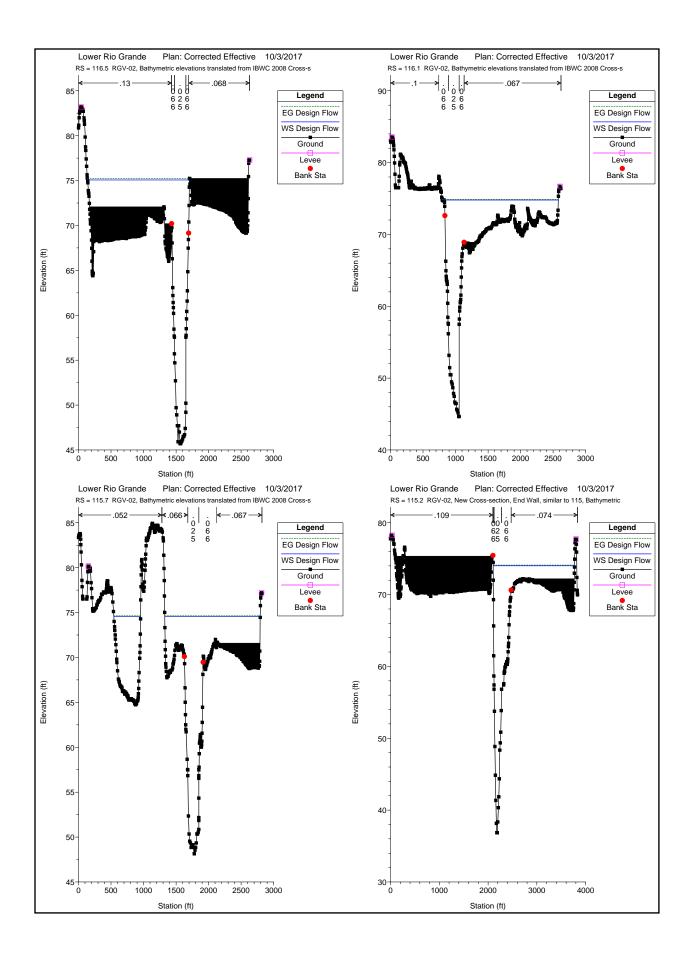


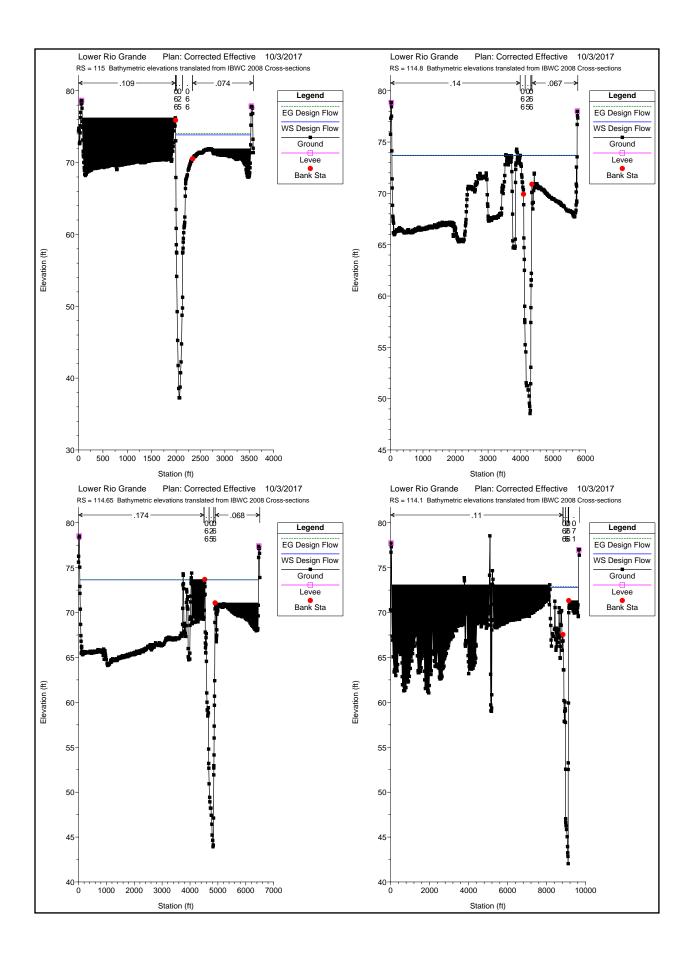


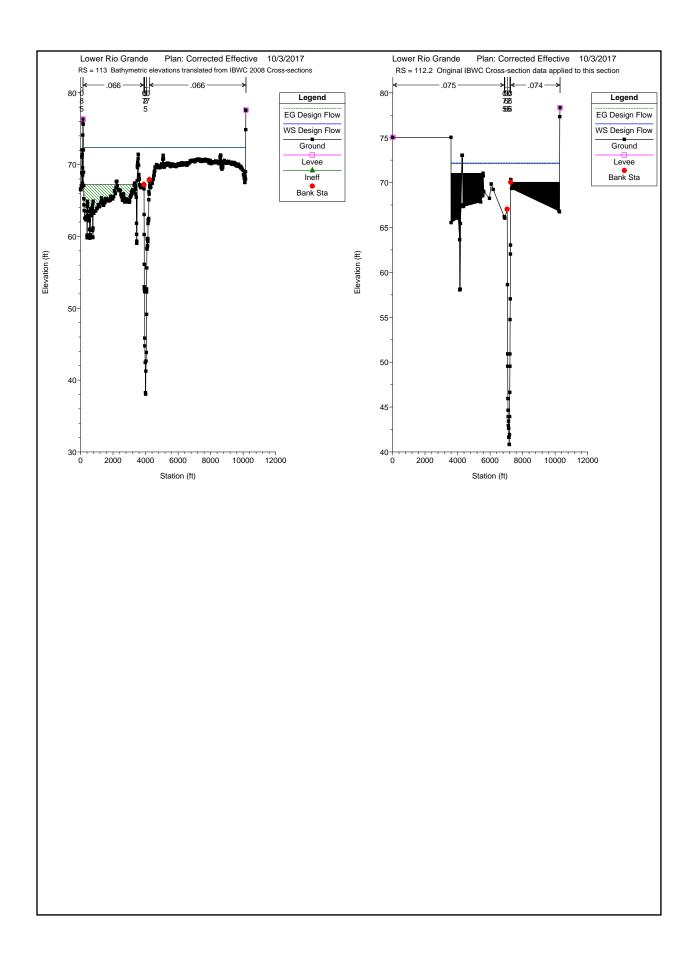












| HEC-RAS Plan:
Reach | Corrected Effect | Q Total | Grande Reach
Min Ch El | : Lower Reach
W.S. Elev | Profile: Desig | n Flow
E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|----------------------------|------------------|------------------------|---------------------------|----------------------------|------------------|---------------------|----------------------|---------------|------------------------|----------------------|---------------|
| Reacii | Kivei Sta | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | Floude # Cili |
| Lower Reach | 186 | 235000.00 | 85.94 | 134.47 | 122.25 | 134.56 | 0.000056 | 4.28 | 181418.80 | 10519.00 | 0.12 |
| Lower Reach | 185 | 235000.00 | 74.90 | 134.34 | 122.19 | 134.39 | 0.000099 | 2.56 | 165883.90 | 11527.83 | 0.08 |
| Lower Reach | 184 | 235000.00 | 86.64 | 133.70 | 123.67 | 134.14 | 0.000062 | 7.69 | 130866.90 | 8180.56 | 0.24 |
| Lower Reach | 183.2 | 235000.00 | 89.30 | 133.66 | 121.45 | 133.71 | 0.000066 | 3.43 | 187558.60 | 12242.89 | 0.10 |
| Lower Reach | 182.4 | 235000.00 | 81.47 | 133.39 | 122.57 | 133.48 | 0.000038 | 4.62 | 237880.10 | 15447.46 | 0.14 |
| Lower Reach | 181.35 | 235000.00 | 93.63 | 133.17 | 118.93 | 133.20 | 0.000042 | 2.83 | 215078.00 | 11846.41 | 0.09 |
| Lower Reach | 180.32 | 235000.00 | 88.56 | 132.89 | 120.12 | 132.98 | 0.000050 | 4.34 | 177130.20 | 10004.96 | 0.13 |
| Lower Reach | 180.3 | 235000.00 | 88.48 | 132.76 | 122.23 | 132.93 | 0.000120 | 5.62 | 159814.20 | 9906.49 | 0.16 |
| Lower Reach
Lower Reach | 179.4
178.5 | 235000.00
235000.00 | 86.78
89.55 | 132.45
131.98 | 117.33
118.78 | 132.49
132.07 | 0.000059
0.000104 | 2.80
4.27 | 203606.60
204219.80 | 11059.48
11162.46 | 0.00 |
| Lower Reach | 177.7 | 235000.00 | 88.45 | 131.46 | 119.10 | 131.53 | 0.000184 | 3.37 | 164895.80 | 9732.60 | 0.10 |
| Lower Reach | 176.8 | 235000.00 | 88.84 | 130.06 | 120.17 | 130.74 | 0.000159 | 9.08 | 141650.00 | 8724.16 | 0.27 |
| Lower Reach | 175.6 | 235000.00 | 90.39 | 129.70 | 116.76 | 129.78 | 0.000087 | 3.85 | 157414.60 | 9058.73 | 0.12 |
| Lower Reach | 174.6 | 235000.00 | 87.41 | 128.82 | 118.75 | 129.43 | 0.000071 | 8.45 | 182921.20 | 11948.83 | 0.25 |
| Lower Reach | 174.2 | 235000.00 | 86.71 | 129.08 | 114.02 | 129.10 | 0.000048 | 2.10 | 209464.80 | 11242.58 | 0.07 |
| Lower Reach | 174 | 235000.00 | 86.00 | 128.99 | 114.93 | 129.03 | 0.000041 | 3.47 | 208595.80 | 11126.15 | 0.11 |
| Lower Reach | 172 | 235000.00 | 76.31 | 128.77 | 115.89 | 128.84 | 0.000044 | 4.13 | 196432.30 | 11810.39 | 0.12 |
| Lower Reach | 171.8 | 235000.00 | 76.31 | 128.43 | 116.04 | 128.56 | 0.000089 | 4.54 | 140409.40 | 8997.97 | 0.14 |
| Lower Reach | 171.15 | 235000.00 | 73.72 | 128.15 | 114.61 | 128.36 | 0.000091 | 5.91 | 138170.80 | 7475.09 | 0.17 |
| Lower Reach | 170.5 | 235000.00 | 75.96 | 124.17 | 118.83 | 127.55 | 0.000295 | 17.14 | 66724.70 | 4922.35 | 0.52 |
| Lower Reach | 170.26 | 235000.00
235000.00 | 77.47 | 125.45
121.80 | 116.54
112.24 | 125.76 | 0.001370 | 6.47
15.53 | 70885.03 | 4963.40
5338.71 | 0.20 |
| Lower Reach
Lower Reach | 170.02
169.9 | 235000.00 | 89.64
89.64 | 121.80 | 112.24 | 124.50
124.16 | 0.000272
0.000210 | 15.53 | 73441.59
80440.89 | 5338.71
5466.26 | 0.48 |
| Lower Reach | 169.83 | 130000.00 | 100.84 | 122.23 | 114.16 | 123.57 | 0.000210 | 8.11 | 50272.75 | 3857.52 | 0.43 |
| Lower Reach | 169.49 | 130000.00 | 84.30 | 122.63 | 103.20 | 122.90 | 0.000282 | 4.93 | 39421.48 | 2515.81 | 0.16 |
| Lower Reach | 169.14 | 130000.00 | 84.64 | 122.07 | 97.06 | 122.75 | 0.000043 | 6.63 | 19605.04 | 523.80 | 0.19 |
| Lower Reach | 169.13 | Inl Struct | | | | | | | | | |
| Lower Reach | 169.12 | 130000.00 | 72.14 | 120.66 | 84.56 | 121.07 | 0.000019 | 5.11 | 25416.00 | 523.80 | 0.13 |
| Lower Reach | 169.1 | 130000.00 | 83.64 | 120.55 | 95.38 | 121.05 | 0.000030 | 5.64 | 23036.52 | 658.45 | 0.17 |
| Lower Reach | 168.85 | 130000.00 | 71.64 | 120.64 | 94.09 | 120.87 | 0.000711 | 4.62 | 62146.12 | 5483.22 | 0.14 |
| Lower Reach | 168.58 | 130000.00 | 69.86 | 119.97 | 96.46 | 120.08 | 0.000365 | 3.68 | 75064.48 | 6382.42 | 0.11 |
| Lower Reach | 168.3 | 130000.00 | 79.02 | 118.97 | 99.09 | 119.15 | 0.001177 | 4.43 | 63955.11 | 6762.83 | 0.15 |
| Lower Reach | 168 | 130000.00 | 76.54 | 118.02 | 98.92 | 118.08 | 0.000384 | 2.80 | 79322.47 | 7173.39 | 0.09 |
| Lower Reach | 167.4 | 130000.00 | 77.24 | 117.38 | 102.41
99.15 | 117.56 | 0.000214 | 5.13 | 90107.92 | 8282.76 | 0.16
0.11 |
| Lower Reach
Lower Reach | 167
166.6 | 130000.00
130000.00 | 71.28
73.61 | 117.04
116.69 | 98.82 | 117.11
116.77 | 0.000176
0.000144 | 3.12 | 86105.66
132496.10 | 9835.36
11568.05 | 0.11 |
| Lower Reach | 166 | 130000.00 | 71.28 | 116.33 | 99.68 | 116.47 | 0.000144 | 4.48 | 98795.84 | 11709.46 | 0.12 |
| Lower Reach | 165 | 130000.00 | 70.77 | 116.07 | 107.37 | 116.12 | 0.000124 | 3.31 | 152949.80 | 15020.63 | 0.11 |
| Lower Reach | 163 | 130000.00 | 70.26 | 115.93 | 102.35 | 115.95 | 0.000103 | 1.71 | 158544.30 | 14406.32 | 0.05 |
| Lower Reach | 162.1 | 130000.00 | 72.94 | 115.61 | 96.63 | 115.64 | 0.000125 | 2.11 | 126019.70 | 11944.35 | 0.07 |
| Lower Reach | 161.4 | 130000.00 | 71.66 | 115.03 | 97.27 | 115.43 | 0.000059 | 6.00 | 103389.00 | 10234.25 | 0.20 |
| Lower Reach | 161.35 | 130000.00 | 71.66 | 115.09 | 95.92 | 115.29 | 0.000034 | 5.24 | 220963.90 | 21779.40 | 0.16 |
| Lower Reach | 161.3 | 130000.00 | 71.66 | 115.07 | 95.81 | 115.27 | 0.000049 | 5.18 | 192937.30 | 19824.66 | 0.15 |
| Lower Reach | 160 | 130000.00 | 71.60 | 115.06 | 94.33 | 115.10 | 0.000040 | 2.68 | 226609.80 | 19804.05 | 0.08 |
| Lower Reach | 159 | 130000.00 | 71.38 | 114.86 | 100.41 | 114.91 | 0.000100 | 3.39 | 173620.90 | 13911.77 | 0.10 |
| Lower Reach | 157.2 | 130000.00
130000.00 | 68.90 | 113.71 | 102.89 | 113.78 | 0.000144 | 3.73 | 103307.90 | 7714.54 | 0.12 |
| Lower Reach
Lower Reach | 157.15
156.93 | 125000.00 | 69.64
57.14 | 112.82
111.79 | 93.60
80.83 | 113.20
112.67 | 0.000264
0.000190 | 6.15
7.64 | 49660.95
18894.58 | 3468.36
541.00 | 0.19 |
| Lower Reach | 156.915 | Bridge | 37.14 | 111.79 | 80.83 | 112.07 | 0.000190 | 7.04 | 10094.50 | 341.00 | 0.20 |
| Lower Reach | 156.9 | 125000.00 | 57.14 | 111.32 | 80.83 | 112.17 | 0.000189 | 7.57 | 18641.60 | 541.00 | 0.20 |
| Lower Reach | 156.87 | 125000.00 | 61.04 | 111.37 | 80.12 | 112.08 | 0.000088 | 7.14 | 24118.64 | 819.90 | 0.18 |
| Lower Reach | 156.855 | Bridge | | | | | | | | | |
| Lower Reach | 156.84 | 125000.00 | 61.04 | 111.25 | 80.12 | 112.02 | 0.000093 | 7.31 | 24025.63 | 819.90 | 0.19 |
| Lower Reach | 156.7 | 125000.00 | 75.00 | 110.64 | 95.13 | 111.84 | 0.000570 | 9.67 | 19991.56 | 1143.07 | 0.30 |
| Lower Reach | 156.6 | 125000.00 | 58.38 | 110.92 | 82.38 | 111.48 | 0.000205 | 6.68 | 30566.47 | 2064.54 | 0.18 |
| Lower Reach | 156.15 | 125000.00 | 67.33 | 110.66 | 91.61 | 110.83 | 0.000255 | 4.38 | 52052.12 | 4348.38 | 0.14 |
| Lower Reach | 155.7 | 125000.00 | 68.64 | 110.30 | 95.25 | 110.44 | 0.000128 | 4.89 | 82724.20 | 7384.21 | 0.15 |
| Lower Reach | 155.36 | 125000.00 | 69.65 | 110.13 | 92.56 | 110.24 | 0.000067 | 3.88 | 92557.17 | 8006.96 | 0.13 |
| Lower Reach | 155.2 | 125000.00 | 70.85 | 110.08 | 97.30 | 110.14 | 0.000107 | 3.01 | 90803.18 | 8007.30 | 0.10 |
| Lower Reach
Lower Reach | 155.01
154.81 | 125000.00
125000.00 | 69.28
66.95 | 109.72
109.62 | 95.38
94.22 | 110.02
109.80 | 0.000085
0.000352 | 5.46
4.77 | 80336.37
53605.74 | 7103.24
5520.31 | 0.19 |
| Lower Reach | 154.6 | 125000.00 | 59.06 | 109.62 | 94.22 | 109.80 | 0.000352 | 5.89 | 37964.20 | 5176.94 | 0.16 |
| Lower Reach | 154.23 | 125000.00 | 48.83 | 107.68 | 78.20 | 108.08 | 0.000595 | 5.46 | 34928.07 | 6162.41 | 0.18 |
| Lower Reach | 153.85 | 125000.00 | 66.44 | 106.12 | 91.35 | 106.73 | 0.001089 | 7.16 | 34551.45 | 6557.37 | 0.27 |
| Lower Reach | 153.61 | 125000.00 | 54.25 | 105.93 | 90.14 | 106.25 | 0.000179 | 5.93 | 62097.04 | 8332.71 | 0.22 |
| Lower Reach | 153.36 | 125000.00 | 68.44 | 105.89 | 92.55 | 105.98 | 0.000204 | 3.87 | 103332.90 | 13748.67 | 0.13 |
| Lower Reach | 152.53 | 125000.00 | 66.64 | 105.13 | 91.80 | 105.21 | 0.000367 | 3.81 | 100435.00 | 14511.48 | 0.14 |
| Lower Reach | 151.7 | 125000.00 | 66.34 | 104.45 | 91.49 | 104.49 | 0.000157 | 2.85 | 120907.50 | 14259.58 | 0.10 |
| Lower Reach | 151.49 | 125000.00 | 57.26 | 104.28 | 86.83 | 104.32 | 0.000126 | 2.65 | 115261.40 | 14189.88 | 0.08 |
| Lower Reach | 151.27 | 125000.00 | 65.88 | 104.15 | 89.83 | 104.19 | 0.000094 | 2.80 | 117549.20 | 14880.70 | 0.10 |
| Lower Reach | 151.255 | Bridge | | | | | | | | | - |
| Lower Reach | 151.25 | 125000.00 | 65.88 | 104.14 | 89.83 | 104.17 | 0.000088 | 2.71 | 117381.60 | 14880.60 | 0.10 |
| Lower Reach | 151.24 | 125000.00 | 68.61 | 104.14 | 96.57 | 104.17 | 0.000078 | 2.07 | 129196.80 | 14914.38 | 0.08 |
| Lower Reach | 150.78 | 125000.00 | 56.38 | 103.88 | 84.99 | 103.92 | 0.000138 | 2.48 | 111420.80 | 16069.49 | |
| Lower Reach | 150.31 | 125000.00 | 63.27 | 103.49 | 91.80 | 103.53 | 0.000176 | 3.01 | 123710.10 | 16850.21 | 0.11 |

| HEC-RAS Plan: | | | | | | n Flow (Continu | | V 101 1 | | T 140 W | F 1 " 011 |
|---------------|-----------|--------------------|---------------|----------------|---------------|-----------------|---------------------|----------|----------------------|------------------|--------------|
| Reach | River Sta | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
| Lower Peach | 149 | (cfs)
125000.00 | (ft)
55.60 | (ft)
103.22 | (ft)
87.32 | (ft)
103.24 | (ft/ft)
0.000090 | (ft/s) | (sq ft)
138811.80 | (ft)
15894.81 | 0.07 |
| Lower Reach | 147.68 | 125000.00 | 62.04 | 103.22 | 89.24 | 103.24 | 0.000090 | 2.10 | 121387.80 | 15372.06 | 0.07 |
| Lower Reach | 146 | 125000.00 | 54.47 | 102.09 | 89.73 | 102.92 | 0.000199 | 1.63 | 131386.80 | 15939.20 | 0.06 |
| Lower Reach | 145.5 | 125000.00 | 53.91 | 101.90 | 84.69 | 101.93 | 0.000037 | 2.67 | 162116.10 | 14695.54 | 0.08 |
| Lower Reach | 145.2 | 125000.00 | 59.17 | 101.83 | 91.16 | 101.85 | 0.000047 | 2.03 | 157852.60 | 14698.44 | 0.06 |
| Lower Reach | 145 | 125000.00 | 63.40 | 101.78 | 90.90 | 101.80 | 0.000049 | 1.92 | 164138.80 | 14681.70 | 0.06 |
| Lower Reach | 144.7 | 125000.00 | 58.64 | 101.76 | 92.83 | 101.69 | 0.000077 | 2.12 | 158592.80 | 14430.71 | 0.07 |
| Lower Reach | 144.55 | 125000.00 | 59.86 | 101.62 | 92.66 | 101.64 | 0.000077 | 2.12 | 155790.20 | 13933.28 | 0.08 |
| Lower Reach | 144.55 | 125000.00 | 57.62 | 101.32 | 92.00 | 101.34 | 0.000072 | 1.56 | 144061.00 | 14707.46 | 0.05 |
| Lower Reach | 143.5 | 125000.00 | 49.57 | 101.07 | 83.88 | 101.09 | 0.000200 | 1.48 | 147289.80 | 14472.39 | 0.05 |
| Lower Reach | 143.25 | 125000.00 | 59.30 | 100.78 | 91.09 | 100.81 | 0.000099 | 2.21 | 135362.90 | 13408.22 | 0.08 |
| Lower Reach | 143 | 125000.00 | 55.70 | 100.48 | 82.44 | 100.52 | 0.000177 | 2.66 | 126771.40 | 13897.96 | 0.09 |
| Lower Reach | 142.5 | 125000.00 | 56.94 | 99.85 | 88.24 | 100.35 | 0.000177 | 7.14 | 123030.90 | 13821.64 | 0.26 |
| Lower Reach | 142 | 125000.00 | 55.80 | 99.96 | 93.37 | 100.00 | 0.000156 | 3.13 | 134759.60 | 14557.85 | 0.10 |
| Lower Reach | 141.9 | 125000.00 | 55.73 | 99.55 | 83.09 | 99.74 | 0.000104 | 4.81 | 112222.60 | 14607.18 | 0.17 |
| Lower Reach | 141.5 | 125000.00 | 55.58 | 99.22 | 86.63 | 99.24 | 0.000179 | 1.84 | 126527.90 | 15672.45 | 0.07 |
| Lower Reach | 140.74 | 125000.00 | 59.26 | 99.00 | 92.32 | 99.05 | 0.000083 | 3.50 | 135759.40 | 14141.88 | 0.11 |
| Lower Reach | 140 | 125000.00 | 55.10 | 98.75 | 80.89 | 98.79 | 0.000090 | 2.40 | 129934.30 | 12152.27 | 0.08 |
| Lower Reach | 139.85 | 125000.00 | 59.64 | 98.46 | 86.22 | 98.59 | 0.000211 | 4.72 | 94413.84 | 11844.61 | 0.15 |
| Lower Reach | 139.01 | 125000.00 | 60.94 | 97.77 | 84.99 | 97.85 | 0.000212 | 3.65 | 79243.95 | 10538.57 | 0.13 |
| Lower Reach | 138.36 | 125000.00 | 48.80 | 96.99 | 92.44 | 97.25 | 0.000162 | 6.28 | 75790.02 | 9869.54 | 0.23 |
| Lower Reach | 137.71 | 125000.00 | 61.64 | 96.40 | 85.40 | 96.52 | 0.000267 | 4.26 | 77058.95 | 10379.94 | 0.15 |
| Lower Reach | 137.14 | 125000.00 | 54.70 | 95.90 | 82.69 | 95.93 | 0.000120 | 2.29 | 107565.70 | 11392.94 | 0.08 |
| Lower Reach | 136.8 | 125000.00 | 58.44 | 95.75 | 87.85 | 95.78 | 0.000121 | 2.54 | 117464.60 | 12292.47 | 0.09 |
| Lower Reach | 136.2 | 125000.00 | 64.41 | 95.23 | 85.41 | 95.27 | 0.000214 | 2.34 | 95613.79 | 12368.16 | 0.10 |
| Lower Reach | 136 | 125000.00 | 58.84 | 94.92 | 78.39 | 95.02 | 0.000123 | 3.74 | 94666.93 | 10558.11 | 0.12 |
| Lower Reach | 135.5 | 125000.00 | 59.94 | 94.74 | 88.08 | 94.83 | 0.000137 | 4.16 | 98697.33 | 10318.00 | 0.14 |
| Lower Reach | 135 | 125000.00 | 56.87 | 94.67 | 82.48 | 94.76 | 0.000134 | 3.90 | 98102.98 | 10020.30 | 0.13 |
| Lower Reach | 134.65 | 125000.00 | 56.00 | 94.47 | 87.48 | 94.57 | 0.000086 | 4.07 | 98533.35 | 9683.39 | 0.15 |
| Lower Reach | 132.75 | 125000.00 | 55.23 | 93.17 | 86.81 | 93.32 | 0.000250 | 5.22 | 88356.83 | 8595.28 | 0.17 |
| Lower Reach | 131.6 | 125000.00 | 52.70 | 92.41 | 83.35 | 92.45 | 0.000106 | 2.88 | 96860.48 | 8484.78 | 0.10 |
| Lower Reach | 131.35 | 125000.00 | 55.24 | 91.95 | 85.86 | 92.21 | 0.000181 | 6.24 | 83803.25 | 8513.89 | 0.20 |
| Lower Reach | 130.93 | 125000.00 | 55.80 | 91.76 | 82.62 | 91.82 | 0.000126 | 3.37 | 85466.36 | 7468.63 | 0.11 |
| Lower Reach | 130.51 | 125000.00 | 57.25 | 91.21 | 82.62 | 91.47 | 0.000226 | 6.06 | 57685.63 | 5414.95 | 0.20 |
| Lower Reach | 129.3 | 20000.00 | 55.69 | 91.14 | 64.28 | 91.14 | 0.000010 | 0.93 | 44257.45 | 4011.31 | 0.03 |
| Lower Reach | 129.27 | 20000.00 | 55.00 | 91.11 | 63.97 | 91.13 | 0.000016 | 1.27 | 30541.56 | 2490.42 | 0.04 |
| Lower Reach | 129.23 | 20000.00 | 55.14 | 91.02 | 63.74 | 91.10 | 0.000040 | 2.21 | 9066.79 | 308.90 | 0.07 |
| Lower Reach | 129.22 | 20000.00 | 55.14 | 91.02 | 63.74 | 91.10 | 0.000040 | 2.21 | 9065.91 | 308.90 | 0.07 |
| Lower Reach | 129.216 | 20000.00 | 55.64 | 90.30 | 67.92 | 91.03 | 0.000097 | 6.91 | 3054.55 | 162.00 | 0.21 |
| Lower Reach | 129.215 | Inl Struct | | | | | | | | | |
| Lower Reach | 129.214 | 20000.00 | 55.64 | 83.18 | 67.92 | 84.40 | 0.000191 | 8.86 | 2257.98 | 82.00 | 0.30 |
| Lower Reach | 129.213 | 20000.00 | 55.64 | 81.79 | 70.42 | 84.16 | 0.001074 | 12.33 | 1621.44 | 62.00 | 0.43 |
| Lower Reach | 129.212 | 20000.00 | 55.64 | 81.76 | 70.42 | 84.13 | 0.001077 | 12.35 | 1619.31 | 62.00 | 0.43 |
| Lower Reach | 129.211 | 20000.00 | 55.64 | 82.87 | 62.88 | 83.02 | 0.000018 | 3.14 | 6377.17 | 296.46 | 0.12 |
| Lower Reach | 129.21 | 20000.00 | 55.64 | 82.88 | 62.24 | 83.00 | 0.000014 | 2.80 | 7144.03 | 324.53 | 0.11 |
| Lower Reach | 129.2 | 20000.00 | 55.04 | 82.91 | 63.09 | 82.95 | 0.000072 | 1.98 | 35043.48 | 8700.72 | 0.08 |
| Lower Reach | 129.03 | 20000.00 | 54.78 | 82.64 | 65.09 | 82.79 | 0.000324 | 3.09 | 7102.10 | 1776.70 | 0.14 |
| Lower Reach | 128.5 | 20000.00 | 55.05 | 82.14 | 64.68 | 82.20 | 0.000136 | 2.31 | 22341.72 | 10887.56 | 0.10 |
| Lower Reach | 127.7 | 20000.00 | 50.83 | 81.89 | 63.50 | 81.94 | 0.000095 | 1.88 | 24434.77 | 7268.20 | 0.08 |
| Lower Reach | 127.4 | 20000.00 | 55.20 | 81.82 | 63.58 | 81.84 | 0.000045 | 1.67 | 29613.60 | 8596.47 | 0.07 |
| Lower Reach | 126.7 | 20000.00 | 50.94 | 81.26 | 63.03 | 81.33 | 0.000182 | 2.48 | 22928.23 | 9250.23 | 0.11 |
| Lower Reach | 125.3 | 20000.00 | 53.62 | 80.34 | 62.68 | 80.40 | 0.000079 | 2.39 | 24903.57 | 9252.31 | 0.10 |
| Lower Reach | 125 | 20000.00 | 50.24 | 80.08 | 59.59 | 80.19 | 0.000191 | 2.81 | 10931.51 | 5397.10 | 0.11 |
| Lower Reach | 124.4 | 20000.00 | 50.30 | 79.66 | 60.86 | 79.70 | 0.000082 | 1.84 | 27247.13 | 9120.94 | 0.08 |
| Lower Reach | 123.8 | 20000.00 | 49.74 | 79.32 | 59.67 | 79.42 | 0.000151 | 2.65 | 11543.28 | 2111.62 | 0.11 |
| Lower Reach | 123.15 | 20000.00 | 47.30 | 79.01 | 59.92 | 79.05 | 0.000116 | 1.91 | 18472.30 | 8252.70 | 0.08 |
| Lower Reach | 122.5 | 20000.00 | 51.94 | 78.59 | 60.45 | 78.69 | 0.000092 | 2.65 | 10994.30 | 3189.85 | 0.10 |
| Lower Reach | 121.46 | 20000.00 | 45.44 | 78.21 | 59.55 | 78.37 | 0.000183 | 3.39 | 8639.19 | 1081.28 | 0.13 |
| Lower Reach | 120.8 | 20000.00 | 50.84 | 77.62 | 59.47 | 77.75 | 0.000154 | 3.02 | 8020.86 | 911.09 | 0.12 |
| Lower Reach | 120.7 | 20000.00 | 50.84 | 77.57 | 59.62 | 77.71 | 0.000187 | 3.07 | 7635.90 | 856.68 | 0.12 |
| Lower Reach | 120.62 | 20000.00 | 46.54 | 77.50 | 58.15 | 77.63 | 0.000159 | 2.96 | 7258.38 | 612.58 | 0.12 |
| Lower Reach | 120.605 | Bridge | | | | | | | | | |
| Lower Reach | 120.59 | 20000.00 | 46.54 | 77.46 | 58.15 | 77.59 | 0.000160 | 2.96 | 7235.52 | 612.28 | 0.12 |
| Lower Reach | 120.5 | 20000.00 | 51.77 | 77.35 | 61.04 | 77.50 | 0.000164 | 3.18 | 7961.95 | 1017.53 | 0.13 |
| Lower Reach | 120.4 | 20000.00 | 51.55 | 77.28 | 61.40 | 77.44 | 0.000219 | 3.34 | 8143.88 | 1212.31 | 0.13 |
| Lower Reach | 120.38 | 20000.00 | 53.44 | 76.99 | 61.37 | 77.07 | 0.000162 | 2.47 | 18071.79 | 4831.68 | 0.11 |
| Lower Reach | 118.81 | 20000.00 | 49.90 | 76.52 | 59.77 | 76.54 | 0.000103 | 1.50 | 24314.51 | 5663.62 | 0.07 |
| Lower Reach | 117.87 | 20000.00 | 47.74 | 76.10 | 56.53 | 76.20 | 0.000098 | 2.81 | 23692.01 | 5128.77 | 0.11 |
| Lower Reach | 117.2 | 20000.00 | 46.84 | 75.49 | 56.42 | 75.66 | 0.000225 | 3.50 | 11811.84 | 3799.63 | 0.14 |
| Lower Reach | 116.5 | 20000.00 | 45.70 | 75.07 | 55.11 | 75.22 | 0.000131 | 3.22 | 9927.58 | 1567.17 | 0.12 |
| Lower Reach | 116.1 | 20000.00 | 44.66 | 74.78 | 55.86 | 74.89 | 0.000154 | 2.88 | 11004.63 | 1777.73 | 0.11 |
| Lower Reach | 115.7 | 20000.00 | 48.14 | 74.57 | 57.36 | 74.64 | 0.000106 | 2.47 | 13116.35 | 1880.79 | 0.10 |
| Lower Reach | 115.2 | 20000.00 | 36.85 | 74.00 | 52.23 | 74.11 | 0.000173 | 2.68 | 9576.30 | 1667.85 | 0.11 |
| Lower Reach | 115 | 20000.00 | 37.25 | 73.85 | 52.46 | 74.02 | 0.000407 | 3.40 | 7886.60 | 1539.87 | 0.15 |
| Lower Reach | 114.8 | 20000.00 | 48.55 | 73.68 | 58.69 | 73.72 | 0.000075 | 2.16 | 32950.76 | 5631.24 | 0.09 |
| | | | | | | | | | | | |

HEC-RAS Plan: Corrected Effective River: Rio Grande Reach: Lower Reach Profile: Design Flow (Continued)

| Reach | River Sta | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|-------------|-----------|----------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
| | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Lower Reach | 114.65 | 20000.00 | 43.92 | 73.64 | 54.88 | 73.66 | 0.000061 | 1.59 | 40904.45 | 5907.60 | 0.07 |
| Lower Reach | 114.1 | 20000.00 | 42.04 | 72.78 | 53.90 | 72.91 | 0.000231 | 3.11 | 9725.84 | 1464.54 | 0.13 |
| Lower Reach | 113 | 20000.00 | 38.05 | 72.39 | 53.01 | 72.40 | 0.000048 | 1.23 | 38993.09 | 9982.95 | 0.05 |
| Lower Reach | 112.2 | 20000.00 | 40.84 | 72.10 | 52.36 | 72.20 | 0.000116 | 2.93 | 19131.64 | 6639.64 | 0.11 |

HEC-RAS HEC-RAS 5.0.3 September 2016 U.S. Army Corps of Engineers Hydrologic Engineering Center 609 Second Street Davis, California

| Х | X | XXXXXX | XX | XX | | XX | XX | Х | X | XXXX |
|-----|------|--------|----|----|-----|----|----|-----|-----|-------|
| Х | X | X | Х | Х | | Х | Х | X | X | X |
| Х | X | X | Х | | | Х | Х | Х | X | X |
| XXX | XXXX | XXXX | Х | | XXX | XX | XX | XXX | XXX | XXXX |
| Х | X | X | Х | | | Х | X | Х | X | X |
| Х | X | X | Х | Х | | Х | Х | Х | X | X |
| x | x | XXXXXX | XX | XX | | x | x | x | Y | YYYYY |

PROJECT DATA

Project Title: Lower Rio Grande Project File : LowerRioGrande.prj

Run Date and Time: 10/3/2017 1:24:18 PM

Project in English units

Project Description: Rio Grande Valley, Texas Fence Replacement US Army Corps of Engineers Fort

Worth District

This model is not for public release until final

approval. Last run date: October 3, 2017

HEC-RAS Version 5.0.3

The following

information was provided on the base model used for the duplicate effective

plan: MARCH 2007

AN ADDITIONAL 70 XSECS THAT WERE SURVEYED ON MARCH 2007 WERE ADDED TO THE IBWC'S 2003 HECRAS BACKWATER MODEL.

THE EARLIER 2003 MODEL'S GEOMETRY WAS CONVERTED FROM 1929 DATUM TO CURRENT NAVD 88 DATUM

WAS PREPARED USING HEC-RAS VERSION 4.0. THE FINAL PLAN MODEL ADDRESSED ASBUILT CHANGES TO THE 2003 MODEL'S BRIDGES AT HIDALGO REYNOSA AND

PROGRESO

2003 (Earlier Model)

CURRENT MAINTENANCE WITH CONTROLLED GROWTH

HEC-RAS BACKWATER MODEL OF THE RIO GRANDE, FROM BELOW BROWNSVILLE TO PEÑITAS.

This model used HEC-RAS Version 3.1.1. Newer versions may give slightly different results.

River sections generally surveyed during 1990. A few sections were surveyed earlier. This version contains 24 additional sections with respect to the 1992 model, that were surveyed in 2001.

Some of the geometry data at the dams, bridges, and floodway inlets were taken from construction drawings and other sources.

flow of 235,000 cfs represents an attenuated flow from 250,000 cfs at Rio Grande City. An additional 5000 cfs attenuation in the flood peak is assumed to occur between Anzalduas Dam and Retamal Dam. Flows have been input to simulate this attenuation. Flow diversions at the Main Floodway in the United States and the Mexican Floodway are 105,000 cfs at each one, as agreed with Mexico in Minute No. 238.

Starting elevation at River Mile 28 does not include storm surge or tidal effects.

All elevations are referenced to Mean Sea Level Datum.

The following description for the corrected effective plan by Michael Baker International July 2017: July 2017

effective river reach and cross-sections were re-cut using the 2008 IBWC-provided surface integrated with 2017 survey data (at cross-sections 145-139.85, 161.4- 160, and 155.2-135.5).

Reach lengths were approximated

headen lengths were approximated between structures based on the duplicate effective model, then cross-sections, and cross-section configurations were approximated using USIBWC-provided hardcopy maps. Reach lengths for 169.83 and 169.49 were revised to 1300 feet, and for 167.4 and 167 were revised to 2500 feet. Applied reach lengths were imported from GeoRAS and not copied from Duplicate Effective Model, and the reach was truncated at cross-section 112.2.

Cross-sections 186, 169,14,

169.12, 169.1, 156.93, 156.9, 156.87, 156.84, 151.27, 151.25, 129.23, 129.22, 129.216, 129.214, 129.213, 129.212, 129.211, 129.21, 120.62, 120.59, and 112.2; and structures at river stations at 169.13, 156.915, 156.855, 151.255, 129.215, and 120.605 were duplicated from the USIBWC 2008 model, except 169.14 was elevated on the left bank to match the surface elevations.

Manning's

n-values, Contraction and expansion coefficients, blocked obstructions, levees, and ineffective flow areas were approximated following associated duplicate effective sections. Bathymetric stations and elevations were translated from the associated duplicate effective cross-sections by graphical interpretations.

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New cross-sections were placed at the beginning and ending of the proposed
New Cross-sections were placed at the beginning and enhang of the proposed floodwall. New cross-sections (excluding interpolated sections) include 180.32, 174, 172, 169.9, 166, 165, 163, 161.35, 161.3, 160, 159, 157.2, 155.2, 145.5, 145.2, 144.7, 144, 143.5, 143, 142, 141.5, 136.8, 136.2, 136, and 135.5. Cross-sections 155.01, 154.6, 154.23, and 153.85 were extended on the left bank to the levee. Bathymetric elevations, n-values, blocked obstructions,
             and ineffective flow areas for these new sections were placed based on
similar upstream or downstream cross-sections.
removed due to conflicts with new cross-sections and cross-sections downstream of 112.2 were eliminated.
Control System Group: United States / State Plane
Zone: Texas South 4205 (GROUND)
Datum Transformation: NAD 1983 (Conus)
(Molodensky)
Geoid Model: GEOID12B
Units: US Survey Feet
Vertical Datum:
NAVD88
The corrected effective and proposed flow boundary condition matches
the water surface elevation of the duplicate effective at cross-section 112.2
Proposed cross-sections with 150-foot enforcement zone cross-section: 180.32 - 169.9, 161.35 (not standard 150' section), 161.3, 155.2 - 145.67* (151.27 and 151.25 not standard 150' sections), 145.5 - 139.85 (75-foot enforcement zone for RGV-01 cut from proposed surface), 139.57* -
135.5, 127.7 - 124.4, 120.8, 120.7, 120.5, 120.4, 117.2 - 115.2.
PLAN DATA
Plan Title: Corrected Effective
Plan File: w:\Proj\160298_ATP\DRAINAGE\RGVPDR\Hydraulics\HEC RAS\Current\LowerRioGrande.p01
                    Geometry Title: Corrected Effective
                    Geometry File: w:\Proj\160298_ATP\DRAINAGE\RGVPDR\Hydraulics\HEC RAS\Current\LowerRioGrande.g01
                    Flow Title
                                            : Design Flow
                                            : w:\Proj\160298_ATP\DRAINAGE\RGVPDR\Hydraulics\HEC RAS\Current\LowerRioGrande.f01
                   Flow File
Plan Description:
July
The Duplicate Effective river reach and cross-sections were re-cut using the 2008 IBWC-provided surface integrated with 2017 survey data
(at cross-sections 145-139.85).
Reach lengths were approximated between
Reach lengths were approximated between structures based on the duplicate effective model, then cross-sections, and cross-section configurations were approximated using USIBWC-provided hardcopy maps. Reach lengths for 169.83 and 169.49 were revised to 1300 feet, and for 167.4 and 167 were revised to 2500 feet. Applied reach lengths were imported from GeoRAS and not copied from Duplicate Effective Model, and the reach was truncated at cross-section 112.2.
Cross-sections 186, 169.14, 169.12, 169.1, 156.93, 156.9, 156.87, 156.84, 151.27, 151.25, 129.23, 129.22, 129.216, 129.214, 129.213, 129.212, 129.211, 129.21, 120.62, 120.59, and 112.2; and structures at river stations at 169.13, 156.915, 156.855, 151.255, 129.215, and 120.605 were duplicated from the USIBWC 2007 model.
Manning's n-values.
Contraction and expansion coefficients, blocked obstructions, levees, and ineffective flow areas were approximated using engineering judgement.

Bathymetric elevations were not obtained with the 2017 survey. Bathymetric
stations and elevations were translated from the associated duplicate effective
cross-sections using engineering judgement.
New cross-sections were placed
New cross-sections were placed at the beginning and ending of the proposed floodwall. New cross-sections include 180.32, 169.9, 161.35, 161.3, and 155.2. Bathymetric elevations, n-values, blocked obstructions, levees, and ineffective flow areas for these new sections were placed based on similar upstream or downstream
cross-sections.
Cross-section 159.16 was removed due to conflicts with new
This model was prepared using HEC-RAS Version 5.0.3.
Coordinate system NAD 1983 State Plane Texas South FIPS 4205 Feet, Lambert Conformal Conic projection.
Plan Summary Information:
Number of: Cross Sections = 234
                                                               Multiple Openings =
                                            = 0
= 4
                     Culverts
                                                                  Inline Structures
                                                               Lateral Structures =
                     Bridges
Computational Information
       Water surface calculation tolerance
       Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
       Flow tolerance factor
       Critical depth computed only where necessary
       Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow
       Computational Flow Regime:
```

Flow Title: Design Flow

Flow File : w:\Proj\160298_ATP\DRAINAGE\RGVPDR\Hydraulics\HEC RAS\Current\LowerRioGrande.f01

Flow Data (cfs)

Design Flow River Reach Rio Grande Rio Grande Lower Reach Lower Reach 186 235000 130000 Rio Grande Lower Reach 156.93 125000

Boundary Conditions

Profile Reach Upstream Downstream Rio Grande Lower Reach Design Flow Known WS = 72.1

Inline Structure Gate Openings River = Rio Grande

Reach = Lower Reach RS = 169.13 Gate = Gate #1

Open Open Ht 34.75 6

River = Rio Grande Reach = Lower Reach RS = 129.215 Gate = Gate #1

Open Open Ht 13.75 1

GEOMETRY DATA

 $\label{thm:corrected} \begin{tabular}{ll} Geometry Title: Corrected Effective \\ Geometry File: w:\Proj\160298_ATP\DRAINAGE\RGVPDR\Hydraulics\HEC RAS\Current\LowerRioGrande.g01\\ \end{tabular}$

RIVER: Rio Grande

REACH: Lower Reach RS: 186

Description: Original IBWC Cross-section data applied to this section Station Elevation Data num=

| St | a Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|------|----------|------|--------|------|--------|------|--------|-------|--------|
| | 0 125.24 | 4 | 124.94 | 20 | 118.94 | 39 | 118.44 | 53 | 118.64 |
| 5 | 6 116.94 | 64 | 116.94 | 72 | 118.94 | 81 | 118.54 | 101 | 117.94 |
| 74 | 3 116.94 | 2095 | 117.64 | 2115 | 117.61 | 2134 | 119.86 | 2141 | 117.84 |
| 214 | 7 113.94 | 2161 | 102.98 | 2169 | 96.64 | 2179 | 89.94 | 2189 | 87.94 |
| 219 | 9 86.94 | 2209 | 86.64 | 2219 | 85.94 | 2239 | 87.94 | 2249 | 89.64 |
| 225 | 9 90.44 | 2269 | 90.94 | 2279 | 91.94 | 2289 | 92.74 | 2299 | 93.64 |
| 230 | 9 93.64 | 2329 | 95.64 | 2349 | 95.64 | 2359 | 95.94 | 2369 | 96.64 |
| 237 | 9 96.94 | 2389 | 96.74 | 2399 | 96.94 | 2409 | 97.64 | 2419 | 97.94 |
| 243 | 9 99.94 | 2449 | 99.94 | 2459 | 101.94 | 2462 | 102.98 | 2465 | 103.56 |
| 249 | 7 109.74 | 2514 | 117.74 | 2526 | 118.11 | 2567 | 117.04 | 2576 | 117.08 |
| 262 | 3 115.34 | 4197 | 113.74 | 4239 | 114.74 | 4255 | 119.24 | 4263 | 118.54 |
| 427 | 0 119.24 | 4276 | 117.24 | 4288 | 116.74 | 4523 | 118.24 | 4528 | 120.24 |
| 453 | 4 119.74 | 6507 | 116.44 | 6541 | 119.44 | 6563 | 118.74 | 6819 | 119.14 |
| 684 | 7 119.74 | 9100 | 117.74 | 9111 | 121.14 | 9125 | 120.94 | 10226 | 120.54 |
| 1051 | 9 125 94 | | | | | | | | |

Manning's n Values num=

Sta n Val 2141 .066 Sta n Val Sta 0 .114 2141 Sta n Val 2161 .015 n Val n Val .066

Lengths: Left Channel

Bank Sta: Left Right 2141 2514 850 1950 1075 0 Station= Elevation= 125.04 Station= 10519 Right Levee Elevation= 125.94

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 134.56 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|---------------|
| Vel Head (ft) | 0.09 | Wt. n-Val. | 0.114 | 0.029 | 0.062 |
| W.S. Elev (ft) | 134.47 | Reach Len. (ft) | 850.00 | 1950.00 | 1075.00 |
| Crit W.S. (ft) | 122.25 | Flow Area (sq ft) | 36456.34 | 14044.55 | 130918.00 |
| E.G. Slope (ft/ft) | 0.000056 | Area (sq ft) | 36456.34 | 14044.55 | 130918.00 |
| Q Total (cfs) | 235000.00 | Flow (cfs) | 23487.43 | 60137.48 | 151375.10 |
| Top Width (ft) | 10519.00 | Top Width (ft) | 2141.00 | 373.00 | 8005.00 |
| Vel Total (ft/s) | 1.30 | Avg. Vel. (ft/s) | 0.64 | 4.28 | 1.16 |
| Max Chl Dpth (ft) | 48.53 | Hydr. Depth (ft) | 17.03 | 37.65 | 16.35 |
| Conv. Total (cfs) | 31355950.0 | Conv. (cfs) | 3133918.0 | 8024120 | .0 20197920.0 |
| Length Wtd. (ft) | 1250.28 | Wetted Per. (ft) | 2152.47 | 385.94 | 8015.75 |
| Min Ch El (ft) | 85.94 | Shear (lb/sq ft) | 0.06 | 0.13 | 0.06 |
| Alpha | 3.33 | Stream Power (lb/ft s) | 0.04 | 0.55 | 0.07 |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 333412.30 | 98786.07 | 350802.80 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 31173.01 | 3711.40 | 33909.66 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

Coeff Contr. Expan.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 185.50*

INPUT

| Descripti | OII. | | | | | | | | | |
|-----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| Station E | levation | Data | num= | 460 | | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | |
| 0 | 123.96 | 9.9 | 124.57 | 21.45 | 124.62 | 37.95 | 124.29 | 54.45 | 124.29 | |
| 75.9 | 124.11 | 89.1 | 124.12 | 103.95 | 124.31 | 120.46 | 124.05 | 128.71 | 124.16 | |
| 184.81 | 123.86 | 221.11 | 124 | 245.86 | 123.96 | 292.06 | 124.1 | 303.61 | 124.54 | |
| 308.56 | 125.88 | 316.81 | 128.82 | 325.06 | 130.83 | 327.5 | 129.93 | 342.17 | 122.81 | |
| 347.06 | 121.14 | 349.37 | 120.85 | 381.28 | 120.42 | 388.61 | 120.75 | 399.52 | 120.44 | |
| | | | | | | | | | | |

| 461.29117.5 562.14 11 716.12 11 816.33 11 857.88 11 990.76 11 992.3 11 1270.94 11 1270.94 11 1363.81 11 1454.25 11 1693.77 11 1811.09 11 1693.77 11 1811.09 11 1693.77 11 1811.09 11 12094.61 11 12094.61 11 12094.61 11 2353.68 11 2419.68 11 2502.76 11 2835.71 11 2835.95 11 28776.28 11 2832.45 11 2832.45 11 2832.45 11 3402.79 11 3142.6 11 3142.6 11 3142.6 11 3142.6 11 3142.6 11 3142.6 11 3142.6 11 3142.6 11 3141.7797.1 3759.88 31 3340.39 11 3340.39 11 3340.39 11 3340.39 11 3340.39 11 3452.5 11 3523.55 11 3523.55 11 3524.5 11 3525.5 11 3525.5 11 3527.5 11 3625.5 11 3627.5 1 | 7.54 601.25 7.91 750.34 8.68 833.44 14.3 870.1 14.65 1002.08 4.74 1050.91 5.69 1163.4 5.35 1285.6 5.31 1378.48 4.77 1488.46 4.74 1581.34 5.35 1701.1 5.98 1818.42 6.18 1911.29 5.87 1974.84 6.34 2104.38 6.87 2177.7 6.96 2265.7 6.49 2368.35 6.87 1277.7 6.96 2265.7 6.49 2368.35 6.79 2368.35 6.79 2368.35 6.92 3436.78 6.96 2265.7 6.49 2368.35 6.92 3436.78 6.92 3436.78 6.93 3418.54 6.93 3418.54 6.95 3474.71 7.06 3535.76 6.92 3455.88 8.88 3303.77 7.62 3345.28 8.85 3201.2 8.25 3272.02 8.25 3272.02 9.98 3637.39 1.94 3680.72 9.98 3637.39 1.94 3680.72 9.98 3637.39 1.94 3680.72 9.98 3637.39 1.94 3680.75 9.98 3637.39 | 117.71 4 117.76 6 118.15 7 118.74 8 114.87 8 114.62 9 115.56 11 115.69 11 115.69 11 115.69 11 115.69 12 117.14 21 117.11 22 117.11 22 117.12 21 117.13 24 117.13 24 117.13 24 117.13 25 117.14 21 117.13 26 117.29 25 118.03 26 117.72 31 117.72 63 118.03 36 117.73 31 117.75 32 118.03 36 117.71 31 117.72 33 117.73 31 117.75 32 118.63 33 117.71 31 117.75 33 117.76 35 118.63 31 117.76 35 117.77 36 118.63 36 117.76 36 117.76 36 117.77 37 117.77 38 117.78 37 117.79 37 118.63 37 117.79 37 118.63 37 117.79 37 118.63 37 117.79 37 118.63 37 117.79 37 118.63 37 117.79 37 117.79 37 118.63 37 117.79 37 | 891.49 6755.23 8379.88 8933.64 911.86 913.82.74 173.17 6388.25 9195.79 6388.25 195.79 6388.25 114.16 185.04 1994.4 185.04 1994.4 185.04 1994.8 185.04 1998.3 185.46 185.04 | 115. 42
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| 10898.21 125
11063.85 125 | 5.8110927.72
5.6711075.33
5.5211226.21 | 125.85109
125.76111
125.42112
num= | 990.04
136.01 | 125.831
125.551 | 1017.92
1180.29
1321.33 | 125.711
125.621 | .1026.12
.1198.33
.1349.21 | 125.76
125.48
125.45 |
| Sta n | Val Sta
.085 833.44
.066 | n Val
.066 35 | Sta | n Val | Sta
3598.12 | n Val
.025 | Sta
3989.15 | n Val
.07 |
| Bank Sta: Lei
3572.:
Left Levee
Right Levee
CROSS SECTION | 39 4052.18
Station=
Station=1 | | 850
Elev | 1950
ation= | Right
1075
130.83
126.475 | Coeff | Contr. | Expan. |
| RIVER: Rio G
REACH: Lower
INPUT | | RS: 185 | | | | | | |
| Description:
Station Eleva
Sta I
0 122
55.76 123
206.63 123 | Bathymetric ation Data Elev Sta 2.67 9.84 3.66 75.44 3.48 239.43 2.91 531.33 | num=
Elev
122.85
123.38 1
122.97 2 | 460
Sta
19.68
108.23
255.83 | Elev
123.9
123.4
123.2
123.05 | Sta
42.64
150.87
367.34
580.53 | Elev
124.01
123.05
122.66
123.23 | Sta
49.2
177.11
439.5
603.49 | Elev
123.25
123.09
122.96
124.12 |
| 100.09 ±24 | ,ı ,,ı,, | 12,12 | | | 500.55 | 223.43 | 000.40 | 101.14 |

| 1377.52 111.6 1390.64 1436.56 111.75 1462.79 1554.63 113 1567.75 1620.23 112.64 1662.86 1771.1 113.89 1784.22 1935.09 114.27 1961.33 2059.72 113.85 2072.84 2207.31 112.94 2237.787 2492.66 113.49 2532.02 2650.09 115.32 2686.17 2774.72 114.9 2797.68 2860 114.48 2886.24 3033.83 115.88 3046.95 3132.22 117.09 3142.06 3250.3 117 3289.65 3380.65 116.04 3411.01 3479.88 116.04 3411.01 3479.88 116.98 3486.44 3604.47 117.25 3617.58 3725.73 118.73 3735.56 3810.93 118.03 3830.6 4020.67 115.02 4030.5 | 119.17 1344 112.57 1400 112.3 1495 111.48 1577 113.52 1725 114.23 1869 114.45 1974 113.04 2092 112.46 2279 113.22 2407 113.65 2594 115.88 2732 115.04 2807 114.67 2912 115.74 3060 116.85 3430 117.29 3502 117.2 3640 119 3751 117.42 3869 116.06 3981 115.59 4056 117.02 4138 116.65 4240 118.15 4466 118.44 44 120.02 4620 115.11 4466 | 04 122.77 721.56 19.75 796.99 79 117.19 941.3 34 117.8 1141.37 68 119.02 1295.52 72 114.1 1351.28 48 112.8 1410.32 59 111.55 1511.99 59 111.14 1584.15 18 113.99 1738.3 45 113.78 2026.92 51 112.78 2128.6 47 112.55 2305.71 38 113.56 2423.78 31 114.55 2614.01 09 116.08 2751.76 52 114.78 2830.48 48 115.37 2938.71 63 116.28 3086.31 616.28 3086.31 616.69 3214.22 57 16.77 3348.69 69 116.46 3450.37 61 16.56 3522.36 52 118.86 3670.02 95 118.71 3787.99 51 115.73 3997.73 55 115.73 3997.73 55 115.73 3997.73 57 115.48 4066.55 65 117.69 4155.03 24 118.28 4256.62 24 114.54 4766.18 81 116.55 4417.19 15 119.09 4476.18 81 116.55 4417.19 15 119.67 4561.38 17 19.09 4476.18 81 116.55 4417.19 15 119.67 4561.38 17 19.09 4476.18 81 114.94 4846.48 95 117.95 5003.78 66 117.95 5003.78 66 117.95 5003.78 67 118.91 4761.28 114.94 4846.48 111.36 5210.23 114.95 5477.97 14 111.36 5210.23 114.75 5147.97 14 111.36 5210.23 172 98.7 5325.72 772 98.7 5325.72 772 98.7 5325.72 772 98.7 5325.72 772 98.7 5325.72 772 16.58 5560.87 776 118.98 6549.92 | 111.23 1361.12 111.59 1426.72 111.53 1541.51 111.6 1610.39 113.72 1754.7 113.35 1915.41 114.09 2040.04 112.95 2161.4 112.77 2315.55 113.42 2482.82 115.46 2640.25 115.03 2761.6 115.03 2840.32 114.59 3020.71 115.95 3102.71 117.23 3224.06 116.06 3368.37 117.66 3456.93 116.4 3568.42 119.53 3689.68 119.29 3801.1 117.99 3935.47 116.38 4010.84 119.19 3935.47 116.38 4010.84 116.13 4096.05 117.26 4177.97 117.47 4266.45 118.56 4371.32 115.95 4427.03 120.72 4495.84 | 135.53
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| 6898.7 118.28 6905.26
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7305.38 117.81 7433.29 | 118.4 6928.
117.53 7056.
118.28 7203.
117.78 7466. | 22 117.76 6934.77
12 117.7 7105.32
71 118.28 7243.07 | 117.93 6983.97
117.68 7151.24
117.82 7269.3
117.88 7577.6 | 117.61
118.17
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117.84 | |
| 7587.44 118.11 7636.63
7780.94 116.28 7817.02
8062.99 114.52 8135.15 | 117.93 7653.
115.93 7876.
114.24 8226. | 03 117.2 7698.95
05 115.6 7885.89
98 113.59 8236.82 | 116.69 7754.7
115.7 7915.41
113.15 8263.06 | 117.64
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113.29 | |
| 8269.62 113.01 8286.02
8364.74 114.26 8407.38
8486.1 112.67 8495.94 | 114.25 8459.
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18 112.37 8525.46 | 115.1 8328.66
115.03 8479.54
112.89 8538.58 | 114.45
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117.19 | |
| 8545.14 117.88 8574.67
8758.35 117.27 8787.87
9109.31 117.53 9158.51
9315.95 117.85 9335.63 | 117.06 8623.
117.45 8856.
117.56 9181.
118.22 9345. | 75 117.4 8886.27
47 117.74 9266.75 | 117.19 8696.03
117.21 9056.83
117.76 9289.71
114.34 9361.87 | 117.46
117.7
117.93 | |
| 9371.71 118.01 9381.55
9434.03 124.81 9447.15
9525.87 126.01 9548.83 | 120.91 9391.
124.86 9466. | 39 122.96 9407.79
83 124.31 9476.67 | 124.77 9417.63
124.55 9493.07 | 123.83
125.7 | |
| 9624.28 126.58 9643.96
9791.56 127.48 9814.52
9899.8 127.3 9922.76
9978.52 127.8 9994.92 | 126 75 9689 | 88 126 75 9739 08 | 127 02 9765 32 | 126 99 | |
| 9978.52 127.8 9994.92
10083.48 126.5610139.24
10260.6 127.0910296.68 | 127.3210155. | 64 126.7610221.24 | 127.8310240.92 | 127.3 | |
| 10368.84 126.1610385.24
10493 48 126 7410559 08 | 126.2510401. | 64 127.110421.32
72 127 0310614 84 | 126.8510454.12 | 127.09
126.95 | |
| 10713.25 126.7410726.37
10814.93 125.9210949.41
11074.05 126.3211087.17 | 126.4610972.
126.0511119. | 37 126.9611008.45
97 126.0311165.89 | 126.411054.37
125.7411201.97 | 126.23
125.7 | |
| 11254.45 125.8311277.41
11516.85 125.4811533.25
11785.82 125.1211841.58
11979.34 12512028.54 | 125.5711608.
125.3111877. | 69 125.3911631.65
66 125.0211926.86 | 125.5811753.02
125.111933.42 | 125.16
124.9 | |
| Sta n Val Sta
0 .085 646.12
5250.72 .066 | .066 5003. | 78 .07 5174.18 | .025 5245.72 | .07 | |
| Bank Sta: Left Right 5003.78 5590.36 Ineffective Flow num= Sta L Sta R Elev | Lengths: Lef | t Channel Right | Coeff Contr. | Expan. | |
| Sta L | T | | | | |
| CROSS SECTION OUTPUT Pro: | file #Design | Flow | | | |
| E.G. Elev (ft) Vel Head (ft) W.S. Elev (ft) Crit W.S. (ft) E.G. Slope (ft/ft) Q Total (cfs) Top Width (ft) | 134.39
0.04
134.34
122.19
0.000099
235000.00
11527.83 | Element Wt. n-Val. Reach Len. (ft) Flow Area (sq ft) Area (sq ft) Flow (cfs) Top Width (ft) | Left OB
0.066
850.00
65589.01
79063.79
89601.98
4352.19 | Channel
0.059
1950.00
18172.04
18172.04
46551.23
586.58 | Right 0:
0.066
1075.00
82122.85
87162.91
98846.8
6589.06 |
| | | | | | |

```
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                      59.44
                                                                                         15.07
                                                                                                        30.98
4674437.0
                                                                                                                        12.46
                                                                                                                          9925691.0
                                                                                                       602.28
                                                                                                                     6602.31
                                   1328.14
                                                                                      4360.95
                                                   Shear (lb/sq ft)
                                                                                          0.09
Min Ch El (ft)
                                                                                                          0.19
Alpha
                                       1.31
                                                   Stream Power (lb/ft s)
                                                                                          0.13
                                                                                                          0.48
                                                                                                                          0.09
                                                                                                      97305.11
                                                  Cum Volume (acre-ft)
Cum SA (acres)
                                                                                     331105.80
                                                                                                                   33549.50
C & E Loss (ft)
                                                                                                      3668.44
                                       0.04
                                                                                     31039.95
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Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

REACH: Lower Reach RS: 184.50*

RIVER: Rio Grande Description: Station Elevation Data num= Sta Elev 31.6 126.41 171.4 125.15 247.01 124.46 Sta 70.57 177.46 267.17 Elev 125.93 Sta 7.29 Elev 125.96 Sta 14.59 Sta 0 Elev 126.42 125.33 110.91 124.88 126.03 125.25 153.15 124.86 196.6 216.76 312.55 236.94 337.75 124.96 125.13 124.87 368.81124.8348 393.2 125.11 403.28 125.1 423.44 125.74 135.86 438.58 127.13 136.64 447.3 128.29 136.05 454.58 130.18 133.95 474.03 478.9 480.68 491.42 520.05 573.73 129.51 127.38 543.31 129.01 639.93 126.1 495 129.68 525.42 129.81 555.83 128.17 623.83 561.2 652.46 126.3 125.47 124.97 706.14 827.81 749.08 838.54 675.38 125.39 716.87 125.23 125.21 765.18 119.95 895.8 118.83 967.37 118.8 1033.58 119.29 863.59 119.99 868.96 119.31 890.44 119.95 904.75 119.51 119.24 924.43 118.41 1004.95 119.37 118.57 118.76 974.53 119.12 1083.68 942.32 118.83 981.69 1010.32 118.99 1146.3 119.57 1232.19 119.32 1182.09 119.53 1250.08 119.72 1196.41 119.63 1257.24 1092.63 119.12 1171.36 119 87 1203.56 119.81 1239.35 1304.11 120.46 1448.7 122.01 1566.79 121.74 1686.68 120.18 1799 1 1267.98 119.05 1287.66 118.86 1335.97 119 1369.97 119.28 120.99 1486.27 1398.6 119.68 1439.75 120.49 1480.91 1541.74 1627.63 1729.62 121.57 1552.48 121.79 1670.57 120.68 1788.67 121.71 1591.84 121.3 1700.99 120.34 1810.14 122.21 1616.9 121.19 1715.31 120.18 1819.09 122.31 120.97 1879.92 120.5 1953.28 121.1 1885.29 120.08 1964.02 120.83 1899.6 119.87 1987.28 120.95 1921.07 120.31 1998.02 1854.22 120 54 1946.12 120.3 2037.38 120.87 2139.31 2008.75 120 61 2012 33 120 35 2028 43 119.88 2073.15 119.64 119.82 2112.49 120.6 2128.58 120.55 2173.28 119.99 2216.19 118.36 2307.36 118.49 2361 119.61 2273.4 118.67 2319.88 118.44 2369.94 119.81 2284.12 117.97 2325.24 118.96 2384.24 2192.94 120.71 2205.46 119.14 2339.55 118.18 2344.91 119.26 2421.79 119.7 2516.54 119.01 2405.69 119.75 2504.02 118.55 2439.67 119.06 2521.9 119.54 2453.97 118.28 2527.26 2393.18 2464.69 119.39 2557.66 119.57 2605.93 120.5 2659.56 119.52 2568.38 120.16 2627.38 120.07 2666.71 120.79 2579.11 119.74 2636.32 117.53 2677.44 2541 57 118 5 2550 51 120 48 120.25 2647.05 2643.47 118.06 119.19 2731.07 118.09 2775.76 119.21 2713.19 118.89 2723.92 118.33 2743.59 117.44 2770.4 117.86 2811.52 119.74 2868.63 2775.76 117.99 2784.7 2829.4 118.28 2840.12 2875.2119.0129 2885.18 2747.16 119.06 2761.46 117.14 2791.86 2850.85 117.2 2799 119.11 2856.21 117.66 119.72 116.84 2936.9 115.67 2947.24 109.88 2998.17 106.68 3003.7 2897 59 118.01 2901.73 118.11 2924.48 110.11 2324.40 110.69 2980.34 99.97 3027.74 113.64 2969.99 2957.58 3006.22100.4952 3008.95 99.06 3038.62 98.22 3053.14 96.34 93.59 3069.292.75314 3073.691.05616 3084.71 80.77 3112.09 81.89 3124.33 82.32 3131.5 87.63 3171.04 89.74 3186.86 92.12 3196.37 96.1 3226.41 97.06 3234.32 98.2 3250.14 94.67 3067.03 3092.28 82.94 3099.86 83.5 86.78 3158.31 93.38 3216.76 3147.44 3202.68 99.91 97.06 3234.32 98.2 3250.14 105.32 3311.85106.0442 3319.15 119.61 3372.59 120.15 3377.69 115.63 3413.37 114.89 3433.76 114.56 3553.53 114.68 3591.75 115.55 3688.6 115.44 3726.82 101.2 3273.86 114.53 3341.41 117.52 3390.44 102.78 3307.72 118.88 3351.83 3258 05 3385.33 116.66 3400.63 114.8 114.41 3466.89 115.21 3647.82 3449.05 114.34 3502.57 115.44 3726.82 117.78 3905.21 118.1 4129.47 115.26 3680.95 3611.71 116.03 3759.95 3933.7 117.11 3772.7 117.99 3956.18 117.86 3805.82 117.89 4012.24 117.61 3854.24 117.86 4075.95 118.05 118.61 4239.05 118.6 4397.06 118.56 4269.63 118.68 4499 118.66 4295.12 118.6 4542.32 118.98 4639.16 118.61 4346.09 118.84 4567.81 4223.76 4381.77 118.84 4623.87 4591 83 118 91 4611 13 118 92 4662 1 119 1 118.92 4002.1 119.42 4817.33 119.42 4983.2 118.41 5217.74 117.92 5345.09 119.02 4700.32 119.44 4886.36 119.24 4738.56 119.47 4901.66 119.27 4809.91 119.33 4919.49 4850.68 5034.17 5248.25 119.26 5052.02 118.06 5259.15 119.11 5164.14 118.17 5299.22 118.68 5207.47 117.87 5304.31 117.72 5416.44 117.26 5604.32 117.44 5434.28 117.39 5645.81 116.71 5816.55 117.47 5495.45 117.24 5676.39 117.25 5562.91 116.99 5747.74 116.5 5921.04 5360.41 117 39 5592.29 116.75 5801.26 116.41 5997.49 5760 48 116 62 5893 116 38 116.62 5093 116.21 6051.01 116.26 6209.01 5938.88 116.22 6028.07 116.3 6073.94 116.15 6244.03 6094.33 116.28 6150.39 116.15 6196.26 6257.43 115.87 6295.65 115.27 6440.92 115.64 6356.82 115.33 6456.2 115.52 6379.75 115.2 6519.92 115.31 6395.04 115.03 6540.31 115.08 6420.53 115.94 6578.53 117.19 6784.95 6560.69 115.5 6565.78 117.22 6718.69 117.81 6621.85 116.97 6800.24 117.39 6660.08 117.05 6846.11 116.75 6999.02 116.1 7132.28 116.54 7253.86 116.82 6932.76 116.05 7118.79 116.47 7042.34 115.88 7155.29 116.38 7072.45 116.03 7173.71 6858 85 116 22 7192.12 116.91 7218.18 116.34 7271.7 116.39 7307.38 116.32 7417.65 115.18 7491.29 116.34 7353.25 115.44 7449.87 116.27 7399.24 115.13 7486.69 116.63 7426.85 115.51 7509.7 7322.67 7436.06 117.62 117.8 7574.96 117.63 7791.58 117.63 7985.26 117.65 8204.42 115.16 7491.29 117.52 7625.93 117.61 7801.77 117.52 7990.35 117.54 8250.29 7518.91 7689.22 117.98 7529.09 117.55 7717.67 117.56 7643.77 117.52 7859.52 117.55 7926.64 7873.13 117.42 8026.03 117.53 117.54 8143.26 117.39 8268.13 8288.52 117.38 8303.81 116.61 8314 116.41 8354.78 116.51 8375.17 116.38 116.53 8502.58 116.41 8655.78 116.39 8525.52 114.59 8664.99 116.47 8599.42 114.46 8678.79 116.41 8628.17 116.4 8692.6 8641.97 119.68 8790.56 120.22 8887.39 8706.41 8812.27 118.83 8729.42 119.42 8826.08 119.74 8743.23 119.53 8849.09 119.19 8766.25 120.05 8874.65 118.14 8915.42 121.75 8956.2 119.1 8943.45 125.57 8999.52 8900.14 118.12 8928.16 119.21 8930.71 120.15 125.06 8981.68 9014 8 126 21 9021 63 126 9095 04 126 17 9108 69 126 4 9129 18 126 47 126.58 9182.09 126.17 9246.96 126.51 9165.02 126.67 9197.46 126.46 9233.31 9188.92 126.38 9221.36 126.18 125.87 9289.64 126.31 9386.94 126.23 9298.17 125.96 9395.47 125.95 9332.31 126.19 9398.89 126.48 9352.8 125.88 9417.67 9371.58 125.94 9508.14 125.36 9625.93 126.12 9436.44 126 9453.51 126.12 9474

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9641.29 125.44 9711.28 125.63 9723.23 125.87 9742.01 125.57 9823.95 125.2 9870.04 125.21 9881.98 125.13 9977.58 125.14 10054.4 124.9710066.34 125.06 10129.51 124.85 10175.6 124.9310194.38 124.810322.41 124.8710351.42 124.83
           n Val
                                                                                                     .015 3372.59
Bank Sta: Left Right 2856.21 3372.59
                                                           Lengths: Left Channel
                                                                                                                  Right.
                                                                                                                                          Coeff Contr.
| Description | 
3372.5910351.42 120.15

Left Levee Station= 478.8
Right Levee Station=9014.805
Blocked Obstructions num=
                                                                                       Elevation= 136.64
                                                                                      Elevation= 126.215
  Sta L Sta R Elev
3385.3310351.42 117.52
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                            RS: 184
 INPUT
 Description: Bathymetric elevations translated from IBWC 2008 Cross-sections
 Station Elevation Data
                                                                                 460
                                                         num=
           Sta
                          Elev
                                               Sta
                                                                Elev
                                                                                    Sta
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                                                                                                                 29.53 128.39
                      129.19
                                            13.12
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                                                                                               128.85
                                                                             72.18
127.95
183.72
                      127.12
127.2
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127.42
                                                                                                                     82.02 127.43 104.98
                                            62.33
                                                           126.75
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                                                            126.72
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127.11
136.56
                                         173.88
     160.76
                         126.1
                                                            126.07
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                                                                                                                  190.28
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                                                                                                                                                                           127.37
                                         242.78
291.99
                                                                              255.9
308.39
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136.15
                                                                                                                   262.46
311.67
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328.08
                                                            126.68
     285.43
                          130.6
                                                            132.76
                       135.72
127.46
                                         344.48
396.97
     334 64
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     449.47
                         125.1
                                          465.87
                                                            126.47
                                                                               482.27
                                                                                                 128.78
                                                                                                                                      128.52
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                                          518.36
                                         557.73
610.22
695.52
                                                                                                 123.54
120.75
119.65
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120.89
120.37
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629.91
     551.17
                       124.85
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                                                                                                                      580.7
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                                                           124.11
121.07
119.68
117.99
95.94
                         122.2
                                                                                                                   659.44
708.65
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725.05
                                                                               702.09
     685.68
                                         738.17
770
820
                       119.58
105.64
                                                                              744.74
                                                                                                  115.7
95.94
                                                                                                                   754.58
790
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                                                                                                                                                      764.42
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                                                                                                   87.94
            810
                         86.64
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                                                                                     880
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                                                                                                92.94 950
97.64 1000
105.94 1079.37
118.02 1118.74
121.33 1167.95
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98.94 1010
107.08 1089.22
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96.64
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                                                            105.64 1076.09
                       102.98 1072.81
          1030
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                       114.28 1102.34
121.27 1154.83
                                                            117.09 1105.62
121.65 1161.39
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117.79 1171.23
   1095.78
    1138.43
                                                           112.63 1207.32
110.23 1276.22
110.69 1387.76
                                                                                                111.16 1220.45
110.1 1302.46
110.68 1420.57
                       114.69 1190.92
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                       111 1253.25
110.49 1351.67
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111.02 1436.97
   1338.55
                       111.51 1499.31
112.62 1597.73
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113.1 1633.82
                                                            111.84 1509.15
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                                                            112.75 1610.85
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116.38 1722.4
116.57 1860.19
   1584.61
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116.69 1712.55
116.69 1840.5
116.77 1978.29
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117.93 2250.6
                       116.9 1686.31
116.55 1774.89
116.79 1906.12
116.89 2040.63
   1669.91
1765.05
                                                            116.64 1692.87
116.66 1827.38
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117.19 2142.33
   1883 15
                                                            116.67 1942.21
                                                            116.87 2060.31
117.95 2204.67
     2165.3
                       117.58 2198.11
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  2309.65
                       118.55 2342.46
118.56 2513.07
                                                            118.46 2408.08
118.43 2529.47
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118.54 2549.15
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118.49 2572.12
  2591.81
2677.11
                       118.72 2604.93
118.87 2693.51
                                                            118.46 2621.33
118.72 2700.07
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118.85 2732.88
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118.96 2749.28
                                                           118.72 2700.07
119.08 2814.9
119.74 2955.98
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120.2 3293.9
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119.71 2913.33
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119.87 2972.38
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119.82 3005.19
   2765 69
                                                                                                 120.1 3077.37
120.12 3198.76
119.94 3307.02
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120.23 3215.16
119.99 3316.87
   3011.75
                       119.91
                                              3038
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                       119.98 3146.26
120.3 3267.65
                                                                            3293.9
3431.7
   3228.28
                       119.25 3412.01
118.75 3517
                                                            119 3431.7
118.53 3543.24
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118.58 3569.49
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                                                                                                118.11 3684.32
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                                                                                                                                     117.86 3694.16
117.26 3808.99
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                                                                                                116.92 3920.54
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     3858 2
                                                            116.82 3900.85
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116.28 4120.67
                                                            116.63 4012.4
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115.83 4186.28
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                                                                                                 115.55 4281.43
115.05 4425.78
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115.11 4435.62
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114.71 4602.94
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                                                                                                 114.92 4534.04
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   4566.85
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   4658 71
                       114.31 4783.38
114.24 4885.09
                                                            114.33 4789.94
114.44 4901.49
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                                                           114.44 4901.49
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   4983.51
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                       114.32 4996.63
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114.38 5124.58
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114.19 5157.39
   5163.95
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                                                                                                 114.41 5259.09
119.57 5321.43
                                                                                                                                     115.33 5265.65
119.57 5337.83
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119.33 5521.55
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    5449.38
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                       119.09 5738.08
   5721.68
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                                                                                                118.43 6279.41
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                                                            118.23 6407.36
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   6525.47
6610.77
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118.06 6630.45
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117.99 6666.54
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117.84 6830.58
                                                            118.06 6748.56
117.74 6843.7
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117.74 6873.23
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                                                                                                117.66 6988.05
117.75 7093.04
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   6889 63
                       117.78 6938.84
117.84 7050.39
                                                            117.83 6948.69
                                                                                                                                     117.72 6991.33
117.78 7099.6
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117.78 7099.6
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117.09 7434.24
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117.79 7175.06
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                       117.77 7145.53
                       117.85
117.64
                                        7253.8
7355.5
                                                           117.63 7270.2
117.45 7375.18
                                                                                                117.76 7296.45
117.44 7421.11
   7332.53
                       116.89 7483.45 117.18
115.3 7568.75 115.48
                                                           117.18 7493.29 116.7 7503.13 115.67 7516.26 115.48 7595 115.21 7621.24 115.26 7631.08
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7788.56
7883.7
                                                                                      115.14 7837.77
115.09 7916.51
                                                                                                                                             114.91 7850.89
114.95 7949.32
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114.95 7959.16
    7995.25
                                                                                       114.64 8047.74
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                                  114.79 8041.18
                                                                                                                                                                                                     114.5 8093.67
                                  114.46 8129.76
                                                                                        114.57 8182.25
                                                                                                                                              114.49 8192.09
    8231.46
                                  114.35 8238.02
                                                                                       114.56 8251.14
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    8277.39 109.78 8290.51
8326.59 113.54 8333.16
                                                                                      109.83 8300.35
116.73 8339.72
                                                                                                                                           110.66 8306.91
117.98 8343
                                                                                                                                                                                                  111.75 8310.19
119.19 8349.56
                                                                                      116.73 8339.72 117.98 8343
124.51 8398.77 124.88 8418.45
124.77 8487.34 124.57 8507.02
       8359.4
                                123.51
                                                           8375.8
                                                                                                                                                                                                   125.42 8441.41
Manning's n Values num= 4

Sta n Val Sta n Val Sta
0 .112 708.65 .066 725.05
                                                                                                                            Sta n Val
                                                                                                                                                 .015 1102.34

        Bank Sta: Left 708.65
        Right 708.65
        Lengths: Left Channel 1037.5
        Right 1100

        Left Levee Station= 328.08
        Elevation= 136.73

        Right Levee Station= 8418.45
        Elevation= 125.42

        Blocked Obstructions
        num= 1

                                                                                                                                                                                                         Coeff Contr. Expan.
  Sta L Sta R Elev
1167.95 8523.43 117.64
                                                                   Elev
 CROSS SECTION OUTPUT Profile #Design Flow
                                                                   134.14
0.44
133.70
123.67
    w.s. Elev (ft) 133.70 Reach Len. (ft) 123.67 Flow Area (sq ft) 23500.00 Flow (cfs) Top Width (ft) 8180.56 Top Width (ft') 1.80 Max Chl Dpth (ft') 1.80 Top Character (ft') 1.80 Top Width (ft') 1.80 T
                                                                                                                                                                                                                    Left OB Channel
                                                                                                                                                                                                                                                                                             Right OB
                                                                                                                              Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                                                                                                                          0.112
                                                                                                                                                                                                                                                               0.015
                                                                                                                                                                                                                                                                                                     0.066
                                                                                                                                                                                                                                                     1525.00
14275.03
                                                                                                                                                                                                                                                                                             1100.00
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                                                                                                                                                                                                                                                        109718.10
                                                                                                                                                                                                                                                                                                  123772.20
                                                                                                                            Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                                                                                                                                                              7368.60
                                                                                                                                                                                                                      365.78
                                                                                                                                                                                                                                                             446.18
                                                                                                                                                                                                                                                                31.99
       Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                                                                                                                              9.11
                                                                                                                                                                                                                                                                                                     15.37
                                                                                                                                                                                                                       192072.5
367.67
                                                                                       29897970.0
                                                                                                                                                                                                                                                            13958940.0
                                                                                        1291.82
86.64
                                                                                                                                                                                                                                                          463.55
                                                                                                                                                                                                                                                                                              7380.41
                                                                                                                                                                                                                              0.03
       Min Ch El (ft)
                                                                                                                                                                                                                                                                  0 12
                                                                                                                                                                                                                                                                                                        0.06
                                                                                                                                                                                                                              0.02
                                                                                                    8.75
                                                                                                                                                                                                                                                                    0.91
       Alpha
       Frctn Loss (ft)
                                                                                                    0.08
                                                                                                                               Cum Volume (acre-ft)
                                                                                                                                                                                                                329701.20
                                                                                                                                                                                                                                                        95855.66
                                                                                                                                                                                                                                                                                            340464.50
                                                                                                                              Cum SA (acres)
                                                                                                                                                                                                                                                         3622.21
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Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 183.80* REACH: Lower Reach

114.35 5558.88

5485.38

115.19 7808.24

Description: Station Elevation Data num= Sta Sta Elev Elev Sta Elev Sta Elev 129.49 47.06 96.6 61.92 129.59 129.59 79.26 128.3 121.37 129.12 183.3 106.51 129.35 86.7 129.06 129.58 128.45 128.6 131.28 198.16 128.57 143.66 129.35 208.06 129.38 153.57 129.55 129.12 129.03 165.96 130.29 215.5 133.59 131.72 232.83 282.63 247.7 305.57 220 45 136.13 235.31 136.44 136.57 293.6 130.52 129.82 325.53 129.29 364.45 128.49 128.16 399.5 127.61 440.94 125.4 471.22 549.05 492.18 578.99 514.13 601.94 542.07 123.25 123.42 123.01 122.84 620.38 635.87 712.7 122.98 122.06 643.85 758.42 123.43 121.77 649.84 827.41 121.82 679.78 896.41 122.17 124.53 703.17 124.36 1020.65 121.61 1131.09 124.24 1048.25 121.49 1144.89 120.86 1260.54 123.38 1079.92 122.04 1170.73 122.15 1103.45 121.79 1193.68 1006.85 1124.83 1213.89 121.14 1249.56 120.92 1264.53 120.67 1282.49 120.43 119.6 1363.32 119.49 1418.2 119.71 1378.29 119.12 1437.16 120.17 1385.27 118.92 1442.15 120.05 1345.36 119.74 1399.24 1393.25 118.84 1468.1 118.57 1533.95 118.76 1475.08 119.16 1545.93 119.01 1482.07 120.54 1556.9 1448.14 118.8 1500.03 1519.98 119.4 1559.9 119.5 120.19 1643.72 119.6 1687.62 119.88 1765.27 120.65 1572.87 119.91 1666.66 120.23 1587.84 120.16 1672.65 119.99 1629.74 119.82 1683.63 1562.89 1658.68 119.58 1755.32 118.62 1797.11 118.39 1836.91 118.92 1695.6 120.08 1778.2 1692 61 119 54 1717 51 119.07 1784.17 118.56 1821.98 118.51 1801.09 119.22 1844.87 118.22 1817.01 119.4 1857.62 112.32 1896.65 1807.06 118.97 1866.41 108.86 1906.89 116.5 1872.74 103.18 1910.31 115.88 1879.57 102.65 1912.7 1848.85 1886.41 92.93 1943.92 88.92 1999.67 93.38 1954.33 89.75 2008.74 91.71 2054.07 87.31 1963.4 90.07 2017.8 1923 11 94.67 1933.52 88.89 1990.6 90.93 2035.94 93.13 2090.34 1981.53 91.48 2045.01 92.95 2099.41 100.7 2192.63 92.45 2072.21 2026 87 93.98 2108.48 103.09 2198.58 104.24 2207.51 2135.68 98.97 2153.82 111.84 2224.33 119.74 2282.98 115.11 2243.2 116.14 2289.38 118.02 2252.13 114.8 2302.16 118.88 2267 112.99 2309.75 2273.4 112.29 2318.14 112.18 2330.93 111.16 2409.49 112.29 2337.32 110.62 2416.61 111.84 2359.62 110.48 2430 111.77 2370.31 2398.81 110.71 2541.85 111.64 2663.3 110.4 2525.88 111.33 2653.72 113.11 2752.79 110.78 2567.42 111.45 2685.68 110.37 2493.91 111.34 2612.54 2462 93 111.07 111.64 2663.3 114.09 2768.77 2711.24 112.3 2733.66 115.18 2810.31 114.09 2768.77 114.89 2954.13 115.04 3107.53 115.72 3251.36 116.46 3423.94 114.95 2922.17 115.01 3034.03 114.99 2934.95 115.12 3075.64 115.07 2976.5 115.27 3129.91 3000.82 3149.08 3334.45 115.4 3216.2 116.37 3353.63 115.47 3228.98 116.3 3391.98 115.8 3283.32 116.37 3487.86 116.08 116.37 3590.14 116.32 3695.6 116.38 3645.71 116.46 3749.94 3532.61 116.3 3551.79 116.23 3606.12 116.33 116.52 3679.63 116.53 3701.99 3667.09 116.88 3855.4 117.32 3987.78 118.87 4120.68 118.79 4274.08 118.66 4373.17 3765.92 116.54 3772.31 116.64 3820.25 116.68 3836.23 116.04 3820.25 116.95 3932.11 117.2 4051.92 118.77 4184.6 118.77 4350.79 117.09 3893.76 117.36 4016.29 117.26 3952.15 117.61 4069.73 4005.59 4139.86 4286.87 118.68 4165.42 118.85 4325.22 118.65 4206.97 118.6 4363.57 118.33 4426.06 117.73 4568.12 118.15 4485.03 117.58 4593.69 117.91 4504.2 117.57 4619.26 118.01 4513.79 117.39 4648.02 4401.11 4683 18 117.1 4689.57 117 19 4740 71 116.82 4769.47 116.23 4929.27 116 82 4801 43 116 7 116.4 4900.51 116.03 4993.2 115.9 5041.13 115.96 4983.6 115.86 5117.84 4961.23 115.21 5245.68 114.83 5363.16 5156.19 115.33 5220.11 114.32 5334.66 115 5281.21 114.94 5306.16 115.18 114.59 5427.84 114.51 5463 114.3 5323.97

114.14 5568.47 114.21 5597.23 114.09 5626 114.19 114.2 5718.68 114.15 5731.47 114.23 5750.64 114.08

114.12 5824.15

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114.16 5932.81
114.07 6057.45
                                        114.08 5954.6
114.29 6089.41
                                                                 114.18 5996.73
114.18 6114.98
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114.31 6134.16
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                                        114.25 6214.06
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                                                                                          114.49 6265.19
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               115.87 6281.18
                                         117.79 6287.57
                                                                 118.73 6306.74
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                                                                                                                   120.02
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                                                                 119.82 7524.4
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                                                                                                                   117.53
 8678.15
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117.58 8981.77
117.52 9122.38
 8799.6
8904.66
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 9018.67
                                                                                          117.32 9160.74
               117.62 9179.91
 9167.13
                                                                   117.2 9199.09
                                                                                          114.26 9205.48
                                                                                                                   113.99
                                                                 115.55 9237.43
121.31 9275.79
 9218.26
               114.06 9227.85
                                        114.72 9234.24
                                                                                          115.39 9253.41
               119.43 9266.2
125.42 9321.51
                                          120.4 9269.39
                                                                                          125.75 9359.34
 9301.35
                                        125.44 9342.9
                                                                 126.21 9351.12
                                                                                                                     124.5
 9373.04 124.18 9394.96
                                        124.85 9419.62
                                                                 124.54 9433.32
                                                                                          124.57 9455.24
Manning's n Values
                                        num=
                                       n Val
       Sta n Val Sta
0 .112 1848.85
                                                         Sta
                                                                 n Val
                                           .066 1866.41
                                                                    .015 2243.2
                                                                                              .066
Bank Sta: Left Right 1848.85 2267
                                        Lengths: Left Channel Right
                                                                                             Coeff Contr.
                                       1037.5 1525 1100
247.7 Elevation=136.5675
9342.896 Elevation= 126.21
           1848.85
Left Levee Station=
Right Levee
                        Station=9342.896
Blocked Obstructions num=
Sta L Sta R Elev
 Sta L Sta R Elev
2282.98 9455.24 116.14
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                        RS: 183 60*
INPUT
Description:
Station Elevation Data
                                        num=
                                                      460
                                        Elev
132.46
131.75
       Sta
0
                  Elev
                             Sta
10.04
                                                      Sta
23.42
                                                                                          Elev
131.39
                                                                    Elev
              132.64
                                                                131.69
                                                                               36.81
                                                                                                                   131.76
                                                                                                         41.83
                                                                              88.68
133.85
    58 56
                 131 4
                             65.25
                                                       71.95
                                                                 130 99
                                                                                         131.07
                                                                                                         97.04
                                                                                                                   131 61
               131.73
                             112.1
                                                     123.82
   103.74
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                                                                 131.38
                                                                                          129.91
127.66
   148.91
               134.42
                           158.95
                                        136.32
                                                     167.32
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                                                                              170.84
                                                                                                         172.6
                                                                                                                   129.38
                            197.22 269.31
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122.2
                                                                 124.74
122.03
                                                                                          124.55
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3106.8
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88.18 3123.07
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3394.73
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  4721.31
             114.15 4741.88 114.32 4754.32
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114.75 4962.77 114.64 5019.62
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114.16 5779.41 114.03 5808.16

5954.6

5900.86

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117.42 5369.95 117.33 5429.46
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117.2
                                                                                                          117.06 5538.36 116.86 5557.02 116.46 5697.03 116.44 5731.25 115.81 5874.36 115.6 5942.81 115.23 6035.94 115.19 6129.6 114.22 6313.42 114.27 6337.7
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                         113.74 6462.56

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117.45 7952.64

115.32 8054.53

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113.48 6661.5 113.5 6674.13
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114.11 7050.4 113.96 7069.06
114.35 7222.13 114.38 7246.41
117.44 7311.73 117.2 7345.96
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113.78 6932.17
114.14 7100.18
   6593.06
   7009.95
   7125.07
7277.51
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117.56 8008.64
113.56 8058
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117.37 7859.31
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117.72 8037.19
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7635.3
   7781.53
7943.31
     8047.6
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   8085.75
8201.53
                         118.12 8103.09
122.01 8238.87
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121.93 8310.43
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121.85 8356.28
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8497.09
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                        121.52 8537.54

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121.05 9225.11

120.65 9390

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120.93 9334
119.93 9411.79
119.61 9620.23
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                                                                                                                                                                                             121.03
                                                                                                                                                   120.66 9355.78
119.76 9461.56
119.7 9670.01
   9203.34
9380.67
   9486.46
                                                                                                                                                                                              119 66
   9716.68
                                                                                                           119.54 9806.05 120.15 9830.33
                                                                  120.71 9930.91
120.4810038.43
                                                                                                           120.46 9951.71
120.2810052.68
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 10096.24 120.6810111.79 120.3310127.35
10180.23 120.2710186.46 122.1310195.79
10225.72 126.3310246.53 126.0410253.46
10284.86 123.78 10290.7 123.310299.46
10328.65 124.98 10349.1 124.51 10363.7
                                                                                                                                                     118.310164.68
125.510211.34
127 10276.1
                                                                                                            118.3510146.01
                                                                                                                                                                                             119.25
                                                                                                           123.4310202.01
126.1810267.34
                                                                                                                                                    123.8710322.82 124.73
124.8610387.05 125.18
                                                                                                           123.2310314.06
                                                                                                            124.610369.53
 Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .066 2989.04 .07 3049.36
                                                                                             Sta n Val Sta
9.36 .025 3336.1
                                                                                                                                                     n Val Sta
Bank Sta: Left Right Lengths: Left Channel Right 2989.04 3379.18 1037.5 1525 1100 Left Levee Station= 167.32 Elevation= 136.405 Right Levee Station=10267.34 Elevation= 127 Blocked Obstructions num= 2
                                                                                                                                                        Coeff Contr.
                                                                                                                                                                                                Expan.
 CROSS SECTION
 RIVER: Rio Grande
 REACH: Lower Reach
                                                                   RS: 183.40*
```

| INPUT | | | | | | | | | |
|--------------------|------------------|--------------------|-----------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| Descripti | on: | | | | | | | | |
| Station E | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 134.36 | 19.13 | 133.73 | 21.73 | 133.92 | 37.38 | 133.54 | 50.42 | 133.85 |
| 64.34 | 133.73 | 73.03 | 134.15 | 82.59 | 136.2 | 86.94 | 136.24 | 91.98 | 126.53 |
| 94.5 | 125.76 | 117.17 | 125.29 | 129.77 | 124.42 | 139.85 | 124.36 | 152.44 | 123.6 |
| 162.52 | 122.62 | 175.12 | 120.96 | 202.83 | 120.14 | 220.46 | 120.28 | 233.05 | 120.09 |
| 238.09
273.36 | 120.84
122.27 | 248.17
283.44 | 121.5
121.64 | 253.21
296.03 | 122.76
121.65 | 258.24
326.27 | 123.04
121.28 | 265.8
381.69 | 122.33 |
| 432.08 | 120.96 | 477.42 | 120.58 | 522.76 | 120.37 | 552.99 | 120.04 | 641.17 | 119.74 |
| 651.25 | 119.55 | 671.4 | 119.64 | 684 | 119.5 | 704.15 | 119.65 | 721.79 | 119.38 |
| 729.35 | 119.46 | 759.58 | 119.16 | 769.65 | 119.29 | 799.88 | 119.18 | 820.03 | 119.82 |
| 830.11 | 119.5 | 847.74 | 120.23 | 880.5 | 120.29 | 890.57 | 119.93 | 900.65 | 120.15 |
| 923.32 | 119.93 | 951.04 | 120.08 | 958.59 | 119.97 | 981.27 | 120.13 | 993.86 | 119.94 |
| 1014.02 | 120.06 | 1019.06 | | 1041.73 | | 1051.81 | 120.29 | 1066.92 | 120.29 |
| 1077 | 121.05 | 1087.08 | 121.19 | 1092.12 | 120.5 | 1102.19 | 116.05 | 1104.71 | 115.54 |
| 1112.27 | 116.13 | 1122.35 | 115.86 | 1129.91 | 116.03 | 1142.5 | 115.73 | 1150.06 | 116.02 |
| 1177.77 | | 1236.84 | 115.6 | 1260.9 | | 1376.31 | 115.11 | 1550.5 | 115.45 |
| 1724.7 | | 1829.32 | | 2003.52 | | 2038.36 | | 2108.03 | 115.65 |
| 2187.99 | | 2198.07 | | 2233.34 | | 2256.02 | | 2278.69 | 115.9 |
| 2286.25 | | 2301.36 | | 2308.92 | | 2352.01 | | 2364.34 | 116.31 |
| 2371.9 | | 2397.09 | | 2404.65 | | 2417.24 | | 2427.32 | 115.68 |
| 2434.88 | | 2447.47 | | 2475.19 | | 2480.23 | 115.46 | 2502.9 | 115.31 |
| 2512.98 | | 2525.57 | | 2540.69 | | 2550.77 | | 2558.32 | 115.22 |
| 2581
2671.69 | 115.21 | 2603.67
2699.4 | | 2616.27
2706.96 | 114.93 | 2643.98
2724.6 | | 2654.06
2742.23 | 115.28 |
| 2752.31 | | 2762.39 | 114.67 | 2790.1 | | 2830.41 | | 2858.12 | 114.7
114.56 |
| 2903.46 | | 2941.25 | | 2948.81 | | 2958.88 | | 2966.44 | 114.9 |
| 2979.04 | | 2994.15 | | 3004.23 | | 3011.79 | 114.72 | 3026.9 | 114.82 |
| 3042.02 | | 3054.62 | | 3072.25 | | 3089.89 | | 3102.48 | 115.56 |
| 3117.6 | | 3137.75 | | 3155.39 | | 3162.95 | | 3167.99 | 114.4 |
| 3185.62 | 115.19 | 3203.26 | 114.61 | 3223.41 | 114.55 | 3248.6 | 114.85 | 3258.68 | 114.49 |
| 3276.31 | 114.34 | 3286.38 | 114.46 | 3298.98 | 114.21 | 3314.1 | 114.64 | 3334.25 | 115.95 |
| 3339.29 | 116.53 | 3349.37 | 118.37 | 3356.92 | 118.61 | 3364.48 | 120.06 | 3372.04 | 119.03 |
| 3379.6 | | 3392.19 | | 3399.75 | 116.91 | 3407.3 | 120.35 | 3432.5 | 119.08 |
| 3455.17 | | 3470.29 | | 3510.59 | | 3533.26 | | 3540.82 | 118.51 |
| 3576.09 | | 3593.72 | | 3611.36 | | 3634.02 | | 3649.14 | 118.21 |
| 3669.29 | | 3684.41 | | 3694.49 | | 3712.12 | 117.65 | 3722.2 | 115.58 |
| 3734.79 | | 3742.35 | | 3767.51 | | 3780.07 | | 3797.66 | 117.7 |
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3965.96 | | 3918.23
3970.98 | | 3938.33
3988.57 | | 3950.89
3998.62 | | 3958.42
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118.11 |
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| 4061.41 | | 4071.46 | | 4023.73 | 116.34 | 4030.3 | | 4109.14 | 117.52 |
| 4119.19 | | 4129.24 | | 4135.55 | 117.42 | 4138.7 | | 4145.02 | 110.96 |
| 4148.18 | | 4155.01 | | 4178.35 | | 4183.17 | | 4191.84 | 97.75 |
| 4195.52 | 96.67 | 4198.1 | | 4205.37 | | 4220.55 | | 4231.77 | 90.86 |
| 4243 | 88.64 | 4264.6 | | 4271.81 | | 4293.41 | | 4322.22 | 91.47 |
| 4336.63 | | 4356.72 | | 4387.04 | | 4401.45 | | 4434.64 | 98.16 |
| 4453.22 | | 4457.46 | | 4461.22 | | 4476.28 | | 4491.35 | 115.99 |
| 4497.41 | | 4514.97 | | 4531.83 | | 4541.95 | | 4552.07 | 114.75 |
| 4562.19 | 113.54 | 4579.05 | 114.58 | 4589.18 | 113.7 | 4599.29 | 113.77 | 4616.16 | 113.12 |
| 4626.27 | | 4633.02 | | 4643.15 | | 4656.64 | | 4670.13 | 110.19 |
| 4676.88 | 109.72 | 4687 | 109.67 | 4720.73 | 110.03 | 4775.83 | 110.2 | 4798.32 | 110.19 |

110.58 4933.25

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111.54 5172.75
112.03 5432.49
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112.07 5390.19
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112.4 6073.59
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114.11 6198.42
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116.42 6208.55
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115.99 6512.22
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116.18 6535.85
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Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .066 4129.24 .07 4191.84
                                                                                 n Val
                                                                                                                    .07 4491.35
                                                                                    .025 4461.22
                                            Lengths: Left Channel
Bank Sta: Left Right 4129.24 4491.35
                                                                                                                    Coeff Contr.
                                                                                                                                                 Expan.
4129.24 4491.35 1037.5

Ineffective Flow num= 2

Sta L Sta R Elev Permanent
0 4129.24 117.44 T
4491.3511318.87 115.99 T

Left Levee Station Color
                                                                                 1525
                                                                                                  1100
Left Levee Station=86.93999
                                                                        Elevation=136 2425
                               Station=11191.79
                                                                        Elevation= 127.79
Blocked Obstructions num=
Sta L Sta R Elev Sta L
0 3349.37 118.37 4514.97
                                                                     3
                                                                Sta R
                                                                                    Elev
                                                                                                 Sta L
                                                                   6500 114.86 9383.4211107.05 123.25
CROSS SECTION
RIVER: Rio Grande
                                                  RS: 183.2
TNPIIT
Description: Bathymetric elevations translated from IBWC 2008 Cross-sections
Description: Bachymetral
Station Elevation Data
Sta Elev Sta
0 136.08 6.56
                                                                   460
Sta
                                                 num=
        Sta Eiev
0 136.08
                                                      Elev
                                                                                                                             45.92 121.62
121.36 116.18
                                                                   13.12 123.16
91.84 119.54
180.4 115.62
                                                 136.08
                                                                                                    16.4 122.14

        123.16
        16.4
        122.14
        45.92
        121.62

        119.54
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        121.36
        116.18

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        116.5

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        117.28

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        833.1
        117.79

        117.14
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        117.11
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        117.79

        118.63
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        1220.13
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                                    882 3
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Manning's n Values num= 5
Sta n Val Sta n Val Sta
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0.33 .025 5574.02
                                                                                                                                            n Val
                                                                                                                                                                                n Val
                                                                                                                                             .07 5603.53
                                                                                                                                                                                   .066
Bank Sta: Left Right Lengths: Left Channel 5269.43 5603.53 1037.5 1525
                                                                                                                                               Coeff Contr.
                                                                                                                                                                                    Expan.
5269.43 5603.53 1037.5

Ineffective Flow num= 2

Sta L Sta R Elev Permanent
0 5269.43 116.47 T
5688.7712250.68 115.98 T

Left Levee State
Left Levee
Right Levee
                                                                                         Elevation= 136.08
                                      Station=12116.23
                                                                                         Elevation= 128.58
Blocked Obstructions num= 3
Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 1308.69 4329.51 119.64 5688.77 7272.61 115.4110358.53 12000 124.96
                                                                                     3
CROSS SECTION OUTPUT Profile #Design Flow
                                                                 133.71
                                                                                          Element
                                                                                                                                                                                                           Right OB
                                                                                         Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
    Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                      0.05
                                                                                                                                                           0.066
                                                                                                                                                                                      0.039
                                                                                                                                                                                                                0.066
                                                                                                                                                                                                           1100.00
                                                                  133.66
121.45
                                                                                                                                                       1037.50
                                                                                                                                                                                 1525.00
    Crit W.S. (ft) 121.35
E.G. Slope (ft/ft) 0.000066
235000.00
                                                                                                                                                     78023.02
                                                                                                                                                                               12559.69
                                                                                                                                                                                                         102969.30
                                                                                          Area (sq ft)
                                                                                                                                                    78436.05
                                                                                                                                                                              12559.69
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                                                                      86134.26
                                                              235000.00
                                                                                                                                                                                 43024.76
                                                                                                                                                                                                           105841.00
                                                                                            Flow (cfs)
                                                                                         Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                         12242.89
                                                                                                                                                                                   334.10
                                                                                                                                                                                                            6647.15
                                                                      1.25
                                                                                                                                                             1.10
                                                                                                                                                                                      3.43
                                                                                                                                                        14.83
    Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                     44 36
                                                                                                                                                                                     37.59
                                                                                                                                                                                                                14 59
                                                             28889300.0
                                                                                                                                                          10588760.0
                                                                                                                                                                                                                      13011370.0
                                                                                                                                                                                   347.81
                                                                                                                                                                                                            6665.79
                                                                1168.09
                                                                                                                                                       5271.89
                                                                                          Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                             0.06
                                                                                                                                                                                    0.15
     Min Ch El (ft)
                                                                                                                                                                                                                   0.07
                                                                      1.99
    Alpha
    Frctn Loss (ft)
C & E Loss (ft)
                                                                                        Cum Volume (acre-ft)
Cum SA (acres)
                                                                       0.06
                                                                                                                                                    325926.30
                                                                                                                                                                                 93962.05
                                                                                                                                                                                                            329162 40
                                                                                                                                                                                                        32497.18
                                                                      0.00
                                                                                                                                                    30679.13
                                                                                                                                                                                 3567.58
Warning: The cross-section end points had to be extended vertically for the computed water surface.
                    Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
RIVER: Rio Grande
                                                             RS: 183.00*
REACH: Lower Reach
```

| INPUT. | | | | | | | | | |
|-----------|-----------|---------|--------|---------|--------|---------|--------|---------|--------|
| Descripti | on: | | | | | | | | |
| Station E | Clevation | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 135.95 | 4.92 | 135.95 | 12.39 | 126.25 | 16.94 | 125.46 | 21.75 | 122.36 |
| 24.16 | 122.12 | 49.71 | 121.69 | 91.48 | 119.26 | 101.97 | 118.88 | 135.57 | 117.08 |
| 151.59 | 117.43 | 176.63 | 117.03 | 202.76 | 117.39 | 221.41 | 117.31 | 228.88 | 118.08 |
| 243.81 | 118.81 | 251.28 | 120.12 | 258.74 | 120.45 | 269.94 | 119.75 | 281.14 | 119.7 |
| 296.07 | 119.08 | 314.73 | 119.14 | 359.53 | 118.85 | 432.91 | 118.68 | 519.47 | 118.82 |
| 579.59 | 118.33 | 650.68 | 118.44 | 695.47 | 118.32 | 733.47 | 118.44 | 798.39 | 118.52 |
| 841.05 | 118.32 | 870.92 | 118.49 | 889.58 | 118.41 | 919.44 | 118.59 | 945.57 | 118.41 |
| 961.89 | 118.69 | 985.94 | 118.27 | 1016.5 | 118.35 | 1061.28 | 118.3 | 1076.21 | 118.82 |
| 1091.14 | 119.01 | 1106.08 | 118.72 | 1132.21 | 119.45 | 1180.73 | 119.57 | 1195.66 | 119.21 |
| 1210.6 | 119.48 | 1244.19 | 119.26 | 1285.25 | 119.46 | 1296.45 | 119.35 | 1330.05 | 119.51 |
| 1378.57 | 119.1 | 1394.69 | 118.8 | 1406.71 | 119.04 | 1421.14 | 117.96 | 1434.57 | 118.08 |
| 1456.96 | 117.88 | 1486.83 | 118.71 | 1494.29 | 118.27 | 1505.29 | 114.46 | 1512.96 | 113.14 |
| 1524.15 | 113.71 | 1539.09 | 113.42 | 1568.95 | 113.18 | 1599.07 | 113.59 | 1608.69 | 113.21 |
| 1639.95 | 113.45 | 1656.78 | 113.13 | 1692.84 | 112.88 | 1714.49 | 113.24 | 1721.69 | 112.76 |

| 1767.38
2106.41
2318.33
2418.25
3297.23
3439.07
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3599.58
3700.57
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4186.26
4290.15
4383.47
4473.06
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4704.49
4816.47
4872.46
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5111.34
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11874.15
12161.41 | 113.52 9380.97 114.31 9523.18 114.71 9663.85 115.32 9896.3 116.0410058.09 116.810328.85 117.0310543.47 117.68 10751.5 111.0410801.03 125.6510860.45 124.3911065.18 125.2111124.61 123.9311319.42 123.7811497.73 123.6211692.54 123.0411917.07 122.7612191.13 123.0112438.77 124.8512574.15 124.512712.83 124.1812811.89 | 113.95 9409.9
114.77 9754.32
115.52 9919.41
116.2710091.11
116.7510378.38
117.1810583.09
117.6 10768
111.0510807.62
124.4810890.18
124.2711075.08
123.8811193.95
123.7811362.35
123.6411728.86
122.9911930.27
122.9512455.28
124.712593.96
124.712593.96
124.712593.96
124.812729.39 | 114.03 9453.84
114.78 9559.5
115.07 9767.53
115.75 9995.36
116.210186.87
116.88 10408.1
117.0610606.21
117.81 10771.3
112.9810817.53
124.3110956.08
124.5211084.98
123.9311213.76
123.7211385.46
123.7811590.18
123.5411735.47
123.0812009.52
122.8512296.53
123.9 12478.4
124.8812607.17
125.0912755.75
124.5112833.36 | 113.99 9473.66
114.61 9599.12
115 9807.15
115.9710015.16
116.6 10233.1
116.7610493.94
117.5410787.82
118.410834.04
124.3911015.65
125.47 11101.5
123.8111276.49
123.911415.75
123.711646.32
123.711646.32
123.711646.32
123.711238.68
124.371238.68
124.3712488.3
124.5212617.07
124.912791.57
124.912791.57 | 114.36
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125.89
124.15 |
| 12989.93
Manning's | 124.4112998.81
n Values | 120.9112937.33
123.7213021.01
num= 5
n Val Sta
.066 5979.51 | 123.7913030.92 | 12513054.32 | 125.3
n Val |
| Bank Sta: | Left Right
994.4 6336.82 | Lengths: Left C | hannel Right | .066 6336.82
Coeff Contr.
.1 | .061
Expan.
.3 |
| Blocked Of | nstructions | 2894.44 Ele
num= 3
Sta L Sta R
6458.97 8011.99 | | Sta R Elev
14000 123.88 | |
| CROSS SEC | | | | | |
| RIVER: Ric
REACH: Low
INPUT | | RS: 182.80* | | | |
| Descriptic
Station E:
Sta
0
24.85
154.26
246.04
313.01
553.3
768.99
1043.99
1187.79
1338.48 | Levation Data
Elev Sta
135.83 3.28
122.23 49.11
118.03 167.74
119.14 271.15
120.78 329.75
120.18 580.26
119.51 820.21
119.85 1065.56
119.48 1221.28
120.1 1355.22 | Elev Sta
135.83 11.65
121.9 73.38
119.15 178.53
120.17 279.52
120.34 350.68
120.31 601.83
119.67 841.79
119.74 1076.34 | 119.19 197.41
121.05 287.89
120.41 400.91
120.19 647.66
119.59 893.01
120.18 1103.31
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120.12 1438.93 | | Elev
122.68
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116.82 |

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114.18 1699.15
  1744.98
                113.61 1753.07
                                          113.87 1774.65
                                                                    113.69 1790.82
113.6 1895.97
                                                                                              114.22 1801.61
113.37 1912.15
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  1920.24
                114.25 1928.32
                                          113.34 1936.41
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                                                                    114.4 2197.94
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  2065.83
                114.34 2138.63
                                          114.49 2184.46
                                                                                              114.55 2270.74
  2359.71
                114.61 2381.28
                                          114.56
                                                      2440.6
                                                                                              114.32
                                                                                                              2508
                                                                                                                        113.14
                  112.4 2591.59
112.2 2820.76
                                          112.25 2596.97
112.18 2874.68
                                                                    112.12 2715.6
112.25 2890.86
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112.46 2944.78
  2756.05
                                                                   112.25 2890.86
114.18 3098.46
113.35 3281.8
113.39 3513.67
113.8 3682.44
113.91 3979.61
113.68 4096.81
  2990.62
                113.36 3020.27
114.02 3203.61
                                          114.02 3071.5
113.77 3252.15
                                                                                              114.08 3152.38
                113.38 3457.05
113.82 3644.77
114 3787.07
                                          113.31 3502.88
113.97 3657.33
114.2 3812.94
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  3400.43
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113.87 3854.04
113.73 4017.28
  3607.1
3770.33
                                                                                                                        114.32
                113.72 3904.27
                                          113.68 3971.24
113.68 4080.07
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  3874.97
                113.89 4054.95
                                                                                               113.9 4109.37
  4034.03
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                                          113.88 4080.07
114.05 4205.64
114.07 4356.32
113.87 4627.17
114.97 4774.88
113.22 4887.89
                                                                                              114.31 4268.42
114.04 4448.41
114.37 4691.88
114.14 4808.37
112.9 4933.94
                                                                    113.92 4251.68
113.88 4395.3
113.97 4682.8
  4147.26
4297.72
                113.74 4184.71
113.94 4343.77
                                                                                                                        113.97
                113.94 4545.77
113.98 4561.42
114.86 4758.14
113.93 4862.78
  4494.45
                                                                    114.23 4787.44
113.15 4913.01
  4842.86
                                                                                                                        113.07
                112.91 4992.54
113.32 5180.89
                                          112.98 5013.46
112.91 5255.37
                                                                    113.56 5038.58
112.99 5272.98
                                                                                               112.9 5122.29
112.8 5289.72
  5151.59
                                         112.91 5255.37
112.85 5398.54
115.8 5473.88
116.9 5546.55
115.86 5741.74
115.94 5955.19
                112.55 5365.05
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116.3 5921.71
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                                                                    116.55 5980.31
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6902.78
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                  98.65 6788.57
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                  89.35 6855.93
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116 9432.79

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115.72 9959.14
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  9932.54
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116.4710419.92
10096 27
                                          115.2310128.64
                                                                    114.8510135.11
                                                                                                                        115 82
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116.3710432.87
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 11564 89
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122.6912256.39
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12536.61
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121.5612964.52
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12701.87
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                                                                                                                        121.69
                121.6213070.64
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                                          121.7913103.01
122.6113273.69
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123.08 13370.1
13037.65
13253.75
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123.7313556.13
  13383 4
                                          123 1913453 22
                                                                    122.9313506.41
                                                                                               123.3713523.76
                                                                                                                        123 24
                                          123.4913569.07
121.9813624.09
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125.49 13633.8
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               120.413744.96 121.4413758.53 122.4913783.33 122.613819.35 122.94 13824.5 124.59 13834.8
13722.36
13811.63
                                                                                               124.913857.96
                                                                                                                        124.96
Manning's n Values
                                          num=
                                Sta n Val Sta
57.6 .066 6635.79
       Sta n Val Sta
0 .082 6557.6
                                                                                               n Val Sta
                                                                    n Val
                                                                      .015 6942.1
                                                                                                                            .061
                          Right
Bank Sta: Left
                                          Lengths: Left Channel
                                                                                                 Coeff Contr.
                                                                                Right
                                                                                                                          Expan.
Bank Sta: Left Right
6719.37 7070.11
Left Levee Station=
                                          1037.5 1525 1100
3.28 Elevation= 135.825
3672.64 Elevation= 127.45
Right Levee
                         Station=13672.64
Blocked Obstructions num=
Sta L Sta R Elev
      Sta L Sta R Elev
1600 5423.65 115.33
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                          RS: 182.60*
INPUT
Description:
Station Elevation Data
                                          num=
                 Elev
135.7
       Sta
                                Sta
                                            Elev
                                                           Sta
                                                                   132.42
                                                                                  16.58
     22 56
              122.99
117.63
                              25 55
                                          122.34
                                                         52.43
                                                                    122
117.81
                                                                                 79.33
157.01
                                                                                              121 08
                                                                                                             97.26
                                                                                                                        118 66
     109.2
183.9
                             130.12
                120.86
                             195.85
                                          121.01
                                                       201.83
                                                                    120.58
                                                                                 216.77
                                                                                               120.48
                                                                                                            255.61
                                                                                                                        121.01
                120.98
121.54
                             298.49
                                          121.52
                                                       317.05
611.16
                                                                    122.14
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641.04
                                                                                               121.59
                                                                                                            402.01
   533.48
                               575.3
                                          121.67
                                                                    121.62
                                                                                              121.79
                                                                                                           664.94
                             763.54
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120.68

120.82

817.32

120.69

841.22

120.85

850.19

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120.98 1154.95
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121.09 1447.75 121.19 1481.29
121.08 1648.28 120.98 1674.83
     1190.8
                       121.68 1199.76
                                                         121.57 1220.68
120.89 1402.44
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                       121.15 1555.32
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1931.78
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113.85 2117.03
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115.59 2771.37
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                      113.82 2810.21
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   2962.59
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114 3766.33

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114.39 4310.76

114.52 4491.66

114.59 4709.67

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113.23 5530.68

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                       114.77
                                            3602
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114.33 4375.84
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114.52 4408.17
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114.39 4468.47
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   4361.78
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114.66 4811.72
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114.81 4853.89
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5706.94
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                      112.81 5943.5
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   5915 67
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   6458.35
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106.99 7782.17
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85.79 7625.82 83.43 7647.38
102.23 7707.13 102.12 7768.03
108.08 7789.25 112.69 7796.33
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7572.09
   7668.94
                                                                                                                               118.2 7853.6
118.2 7853.6
117.52 7967.37
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7873.67
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113.9 9299.08
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                                                         120.09 7816.43
118.81 7927.22
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8735.35
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114.12 9220.87
113.61 9312.12
113.17 9468.53
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                                                                                           113.8 9344.71 113.54 9370.77

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115.39 9559.76 115.1 9569.55

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 12779.2
13294.05
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  14477.2 121.7314491.83
14553.3 121.6214565.01
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                                                                                                                                 120.47
                                                                                                                                               14533.1
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                                                           122.414570.86
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                                                         122.114623.55
                                                                                           124.4714635.27
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .082 7444.33 .066 7536.28 .015 7843.55
                                                                                                                               n Val Sta n Val
.066 7927.22 .061
Coeff Contr. Expan.
CROSS SECTION
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RIVER: Rio Grande

RS: 182.4

Description: Bathymetric elevations translated from IBWC 2008 Cross-sections

| 0 | cacion E | TEVALIUM | Data | mun- | -100 | | | | | |
|---|----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| | 0 | 135.57 | 16.4 | 135.47 | 19.68 | 130.55 | 22.96 | 123.3 | 26.24 | 122.45 |
| | 55.75 | 122.11 | 75.43 | 121.27 | 85.27 | 121.25 | 104.95 | 118.05 | 118.06 | 116.81 |
| | 141.02 | 116.98 | 157.42 | 117.78 | 170.54 | 119.43 | 183.65 | 120.05 | 200.05 | 122.58 |
| | 213.17 | 122.83 | 219.73 | 122.28 | 236.13 | 122.2 | 278.76 | 122.82 | 314.84 | 122.81 |
| | 350.91 | 123.01 | 400.1 | 122.84 | 439.46 | 123.03 | 583.76 | 122.97 | 629.67 | 123.13 |
| | | | | | | | | | | |

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121.85 790.37
122.07 931.39
121.97 1151.12
                                                                                                      783.81
    826.44
993.7
                    121.85 836.28
122.13 1019.94
                                                     122.02 895.31
121.93 1082.25
                                                                                     121.83 921.55
122.17 1098.65
                                                                                                                                                       121.86
  1157.68
                                                                                     122.19 1265.9
121.96 1374.12
122 1623.37
                    121.98 1197.03
                                                     122.32 1252.78
                                                                                                                      122.47 1292.14
                                                                                                                                                       122.31
  1305.25
                    123.18 1315.09
                                                     123.05 1338.05
                                                                                                                       121.99 1426.6
                                                                                                                      121.88 1652.88
  1515.14
                          122 1551.22
                                                     121.86 1587.29
                                                                                     121.8 1836.54 121.53 1872.61
116.96 1931.64 115.96 1957.88
                    121.79 1738.15
119.64 1911.96
                                                     121.9 1793.9
120.51 1925.08
  1895.57
        1971
                    115.07 2003.79
113.63 2056.26
                                                     113.76 2016.91
115.15 2062.82
                                                                                     114.04 2030.03
114.78 2082.5
                                                                                                                      115.79 2036.59
                                                                                     114.04 2030.03

114.78 2082.5

114.4 2161.21

114.61 2230.08

114.34 2321.91

116.7 2492.44

117.19 2653.14
                                                                                                                       115.47 2118.57
                                                                                                                      115.47 2118.57
115.22 2174.33
115.47 2249.76
114.87 2331.75
117.13 2508.84
117.01 2669.54
  2128.41
                    115.05 2141.53
                                                     114.49 2154.65
                                                                                                                                                       115.48
                    114 2200.56
114.54 2269.43
                                                     114.6 2216.96
114.64 2302.23
  2253.04
                    114.5 2351.42
116.91 2561.31
                                                     115.47 2403.9
117.16 2597.39
  2341.58
  2538.36
                                                    117.32 2758.09
117 3007.33
112.72 3154.91
112.89 3348.41
113.14 3577.98
                                                                                     117.19 2653.14
117.19 2866.31
116.86 3040.13
112.47 3213.95
112.62 3384.48
113.78 3633.73
  2695.78
2964.7
                    117.13 2708.9
117.52 2987.66
                                                                                                                      117.45 2892.55 117.33
115.11 3046.69 114.5
                                                                                                                      112.55 3250.02
112.72 3427.12
114.94 3656.69
  3082.76
                    113.03 3148.36
112.52 3335.29
                                                                                                                                                       112.43
  3492.71
                    112.72 3512.39
    3669.8
3830.5
                    116.27 3732.12
116.69 3882.98
                                                     116.58 3764.91
116.26 3892.81
                                                                                     116.38 3791.15
115.77 3922.33
                                                                                                                      116.61 3823.94
115.3 3932.17
                                                                                                                      115.3 3932.17
114.98 4201.09
114.88 4348.67
115.04 4633.99
115.04 4883.23
115.3 5158.71
  3951.85
4237.17
                    114.93 3987.92
114.95 4256.84
                                                     114.71 4073.19
114.79 4269.96
                                                                                      114.74 4132.22
115.02 4309.32
                                                    114.79 4269.96
114.9 4522.48
115 4801.24
115.23 5040.65
115.55 5325.96
115.8 5558.81
                    114.74 4437.22
115.13 4784.84
                                                                                      114.83 4624.15
115.14 4834.04
  4365.07
                                                                                   115.14 5083.28 115.79 5375.16

115.42 5342.36 115.79 5375.16

115.75 5578.49 115.9 5624.4

116.02 5765.42 115.86 5788.38

115.79 5886.76 115.1 5903.16

113.56 6090.09 113.37 6122.89

113.28 6329.5 113.43 6388.53

113.17 6585.3 113.07 6650.89
                    115.1 4968.5
115.53 5286.61
115.55 5450.59
  4942.26
  5221.02
5394.83
                    116.21 5703.11
115.75 5837.57
                                                     115.91 5749.02
116.07 5860.53
  5693.27
  5821.17
                                                    113.49 6054.02
113.49 6306.54
113.06 6575.46
113.22 6709.92
114.5 6772.23
                    113.65 5988.43
113.32 6198.32
  5949.07
                                                                                                                                                          113.5
                                                                                     113.17 6585.3
113.06 6729.6
114.11 6785.35
114.27 7014.91
114.6 7162.49
114.56 7421.57
                    113.33 6493.47
112.98 6696.8
113.21 6749.27
       6441
                                                                                                                                                       113.17
                                                                                                                      113.07 6650.89
114.21 6736.16
114.4 6841.1
114.49 7024.75
114.47 7293.67
114.59 7451.09
  6677.12
6742.71
                                                    114.5 6772.23

114.46 6942.76

114.45 7093.62

114.75 7382.22

114.87 7513.4

116.44 7638.02

113.91 7739.69

113.97 7923.34
                    114.26 6890.29
114.54 7087.06
  6880.45
                    114.62 7359.26
  7339.59
                                                                                                                                                         114.8
                                                                                     114.56 7421.57
114.72 7549.47
114.88 7651.14
114.21 7765.92
114.15 7933.18
                    114.66
                                                                                                                       115.01 7565.87
                    114.06 7497
115.12 7628.18
114.16 7713.45
114.1 7893.82
                                                                                                                      114.34 7674.1
113.91 7815.12
115.54 7946.3
  7601.95
7693.77
                                                                                                                                                        114.06
  7861.03
                                                    113.97 7923.34
118.37 7972.53
119.75 8021.72
112.97 8093.87
118.87 8166.02
                                                                                     118.73 7992.21
119.35 8041.4
112.24 8103.71
118.88 8169.3
                                                                                                                      116.52 7998.77
112.48 8051.24
                    115.35 7965.97
119.02 8018.45
  7952.85
  8008.61
                    111.45 8080.76
116.76 8156.19
  8067 64
                                                                                                                       112.16 8126.67
  8136.51
8185.7
                                                                                                                      118.16 8179.14
                                                                                                                      118.16 8179.14

94.17 8271.98

84.47 8371.98

106 8503.88

120.81 8536.69

119.8 8664.63

119.69 86979.57

119.74 9360.12

119.28 9560.23
                                                    118.87 8166.02
105.17 8201.98
91.47 8321.98
97.97 8421.98
108.76 8523.57
119.89 8615.42
                                                                                     101.47 8231.98
88.47 8341.98
104.97 8425.98
                    105.62 8191.98
92.47 8311.98
88.47 8411.98
  8391.98
                                                                                                                                                        105.38
  8510.44
8543.25
                    105.83 8517
121.78 8549.81
                                                                                      113.78 8530.13
119.72 8641.67
                                                    119.89 8615.42
119.6 8858.19
119.73 9205.93
120.01 9494.62
118.83 9734.1
115.8 9855.48
115.13 9996.55
115.0510088.41
                                                                                     119.79 8897.55
119.87 9271.54
119.83 9501.18
  8690 88
                    119.84 8743.37
  9015.65
9445.41
                    119.74 9150.16
119.83 9474.94
                                                                                                                                                       119.12
                                                                                     117.72 9776.75
116.11 9888.29
                                                                                                                      117.28 9799.71
115.9 9901.41
  9579.92
                    118.85 9606.16
                    116.48 9848.92
115.29 9963.74
114.81 10055.6
114.3810213.07
115.2510262.28
  9832.52
                                                                                                                                                        115.52
                                                                                    116.11 9888.29 115.9 9901.41
115.2910016.23 114.9210026.07
114.7310114.65 115.6710150.74
114.4710232.75 115.0410245.88
115.08 10291.8 115.4910304.92
114.4710416.46 114.0710439.43
115.5110550.97 115.2910573.93
115.0210652.67 116.2610708.44
    9953.9
10042.48
                                                     114.7110226.19
114.9110281.96
10196 67
                                                     114.2310370.54
10314.77
                    115.59 10360.7
                                                     114.4110544.41
115.5610626.42
                    114.2410508.32
10580.49
                      116.810600.18
                    118.0210790.45
117.9110931.51
118.2711154.59
118.311417.03
                                                     117.8610829.82
118.0510997.12
                                                                                     118.04 10849.5
117.9111062.74
                                                                                                                      117.8910875.74
118.02 11085.7
10734.68
10898.71
                                                                                    117.9111062.74
118.2711279.25
118.311508.89
117.5111643.39
119.7111850.06
119.82 11978
                                                    118.111180.84
118.4911462.96
                                                                                                                      118.2211292.37
118.4711564.66
11134.91
11387.51
11604.02
                    118.7111626.99
                                                       118.311636.83
                                                                                                                       119.1711672.92 119.41
 11712.28
                    119.3611764.77
119.7411932.08
                                                     119.4711817.26
119.56 11945.2
                                                                                                                      119.4311863.19
119.7112010.81
                                                                                                                      119.7112010.81
120.1812325.74
120.7412742.37
121.2813014.65
120.913181.96
120.713546.11
                    119.8912125.63
120.3512440.56
                                                     120.1112155.15
120.512565.22
                                                                                     120.0212207.64
120.6112614.43
12069.86
                                                                                                                                                          120.4
12378.23
                                                                                                                                                       120.74
                                                     120.9712912.96
121.0213067.14
                                                                                     120.9112994.97
  12821 1
                      120.812896.55
13037.62
                    121.6513054.02
                                                                                     120.5113431.29
120.5913946.34
120.2414107.09
13250 86
                    120 6413283 66
                                                     120.7713398.48
                                                                                                                                                        120 54
                    120.5813719.98
120.3614077.56
                                                     120.4513752.78
                                                                                                                      120.414015.23
119.6514143.17
14064.44
14215.35
14490.92
                    119.14 14258
119.1914553.25
                                                     119.2214313.76
119.0814618.86
                                                                                     119.0214379.38
119.2814651.67
                                                                                                                       119.2114435.15
119.2114671.35
                    119.2514786.17
119.74 15051.9
120.7315133.91
                                                                                     119.514904.27
119.8915104.39
                                                                                                                      119.8314946.92
120.7715110.95
115.5115166.72
14720.56
                                                     119.5614828.82
                                                                                                                                                        119 88
                                                     119.9315078.14
115.7515147.04
15124 07
                                                                                      115 0715163 44
                                                     125.3815209.37
121.0715274.98
                                                                                      126.0615219.21
                                                                                                                      121.715229.05
119.5115301.22
                                                                                      119.3215294.66
15245.45
                    126.3415258.58
                                                                                                                                                       120.05
                                                                                                                       123.2515383.24
                    120.5615356.99
                                                     121.5315363.55
                                                                                      123.0215370.12
  15406.2 120.6315416.04 121.25 15422.6 124.3615435.73 124.5715465.25 124.29
                                        Sta n Val Sta n Val Sta
18.45 .066 8179.14 .015 8523.57
         Sta n Val Sta
0 .082 8018.45
                                                                                                                      n Val Sta
.066 8536.69
Bank Sta: Left Right Lengths: Left Channel Right 8169.3 8536.69 1987.52 1916.67 1916.38 Left Levee Station= 0 Elevation= 135.57 Right Levee Station=15229.05 Elevation= 126.32
                                                                                                                           Coeff Contr.
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R Elev
72.11 171.27 119.54 1938.03 7959.44 116.59
CROSS SECTION OUTPUT Profile #Design Flow
                                                                             Element
                                                                                                                                                         Channel
                                                                                                                                                                              Right OB
    Vel Head (ft)
W.S. Elev (ft)
                                                                             Wt. n-Val.
Reach Len. (ft)
                                                                                                                                     0.082
                                                            0.09
                                                                                                                                                           0.021
                                                                                                                                                                                  0.061
    Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                         122 57
                                                                            Flow Area (sq ft)
Area (sq ft)
                                                                                                                               126314 40
                                                                                                                                                        13093 07
                                                                                                                                                                               98472 59
                                                                                                                               126314.40
88054.55
    O Total (cfs)
                                                     235000.00
                                                                               Flow (cfs)
                                                                                                                                                        60467.89
                                                                                                                                                                               86477.58
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                               235000.0
15447.46
                                                                             Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                                                                          367.39
                                                                                                                                  8151.51
                                                                                                                                                                               6928.56
                                                                                                                                                              4.62
                                                     51.92
                                                                                                                                       0.70
                                                                                                                                                                                    0.88
                                                                                                                                  15.50
    Max Chl Dpth (ft)
Conv. Total (cfs)
                                                                            Hydr. Depth (ft)
Conv. (cfs)
                                                                                                                                                           35.64
                                                                                                                                  14306810.0 9824622.0
```

| Length Wtd. (ft) | 1944.26 | Wetted Per. (ft) | 8162.60 | 385.64 | 6946.16 |
|------------------|---------|------------------------|-----------|----------|-----------|
| Min Ch El (ft) | 81.47 | Shear (lb/sq ft) | 0.04 | 0.08 | 0.03 |
| Alpha | 6.10 | Stream Power (lb/ft s) | 0.03 | 0.37 | 0.03 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 315251.50 | 92183.70 | 318797.70 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 30039.77 | 3518.46 | 31811.54 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 182.05*

| REACH: LO | wer keacn | RS: 182.05* | | | |
|----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------|
| INPUT | | | | | |
| Descripti | | 460 | | | |
| Station E | levation Data
Elev Sta | num= 460
Elev Sta | Elev Sta | Elev Sta | Elev |
| 0 | 129.06 4.37 | 128.7 10.93 | 129.54 29.51 | 135.05 37.16 | 135.47 |
| 47.78 | 134.88 50.93 | 133.29 56.44 | 122.41 59.19 | 120.85 83.96 | 120.43 |
| 108.75
191.34 | 119.55 125.27
117.97 205.11 | 117.16 136.27
119.54 216.12 | 116.37 169.32
119.62 221.63 | 116.66 180.33
119.2 249.49 | 117.65
118.94 |
| 276.04 | 119.38 318.5 | 119.16 373.05 | 119.02 221.03 | 119.17 527.24 | 119.18 |
| 573.29 | 119.24 610.45 | 119.46 668.85 | 119.07 695.18 | 118.36 730.97 | 118.37 |
| 739.23 | 118.51 788.79 | 118.4 859.95 | 118.6 893.42 | 118.46 945.73 | 118.65 |
| 959.5
1099.91 | 118.51 1003.55
118.86 1121.93 | 118.58 1009.05
118.76 1132.94 | 118.48 1042.09
119.34 1160.48 | 118.75 1088.89
118.53 1234.82 | 118.67
118.48 |
| 1309.15 | 118.69 1369.72 | 118.62 1385.46 | 118.5 1424.78 | 118.67 1468.84 | 118.48 |
| 1496.37 | 118.59 1543.17 | 118.55 1578.97 | 118.34 1609.25 | 117.41 1628.52 | 117.08 |
| 1642.28 | 117.66 1653.3 | 115.28 1658.81 | 114.6 1680.84 | 113.99 1691.85 | 113.99 |
| 1719.38
1768.93 | 113.14 1730.39
113.85 1785.46 | 113.33 1741.41
114.32 1815.74 | 114.5 1755.17
113.58 1824 | 113.07 1763.43
114.03 1846.03 | 114.09
113.59 |
| 1851.53 | 114.13 1862.55 | 114.3 1873.56 | 113.31 1884.57 | 113.73 1898.34 | 113.76 |
| 1909.35 | 114.34 1925.87 | 114.07 1928.63 | 113.67 1969.92 | 113.57 1986.44 | 113.95 |
| 1994.71
2143.38 | 114.89 2002.96
115.29 2187.43 | 113.71 2011.22
115.44 2202.94 | 114.33 2055.28
115.33 2240.1 | 115.12 2129.61
115.68 2298.48 | 115.44
116.69 |
| 2335.65 | 117 2351.56 | 117.44 2378.11 | 117.55 2404.65 | 117.03 2465.51 | 117.01 |
| 2494.89 | 117.2 2505.51 | 116.74 2526.08 | 116.91 2542.66 | 116.71 2561.87 | 116.12 |
| 2594.91 | 114.59 2616.97 | 113.97 2625.19 | 113.48 2659.44 | 112.53 2675.37 | 112.67 |
| 2685.76
2903.63 | 112.47 2765.61
112.51 2969.35 | 112.51 2806.91
112.62 2985.87 | 112.43 2837.2
112.92 3040.94 | 112.66 2848.21
113.35 3087.74 | 112.49
114.13 |
| 3118.02 | 115.03 3170.34 | 115.29 3197.87 | 115.19 3252.93 | 115.36 3296.99 | 115.1 |
| 3305.24 | 114.77 3354.81 | 114.25 3407.92 | 114.08 3456.68 | 114.12 3506.23 | 114.3 |
| 3564.05
3762.29 | 114.19 3621.87
114.3 3811.33 | 114.36 3654.91
114.28 3919.22 | 114.23 3687.95
114.48 3933.43 | 114.31 3701.71
114.38 4013.05 | 114.18
114.58 |
| 4054.12 | 114.47 4067.89 | 114.58 4186.28 | 114.62 4208.3 | 114.73 4268.88 | 114.74 |
| 4294.4 | 115.05 4331.55 | 115.11 4347.46 | 114.97 4405.86 | 115.09 4448.33 | 115.33 |
| 4508.4 | 115.18 4522.17 | 115.46 4549.7 | 115.43 4566.22 | 115.23 4623.5 | 115.49 |
| 4703.88
4851.75 | 115.39 4720.4
115.57 4877.33 | 115.5 4750.89
115.55 4896.61 | 115.41 4803.98
115.76 4924.14 | 115.65 4816.76
115.53 4937.9 | 115.86
115.74 |
| 4979.2 | 115.06 4992.97 | 114.39 5048.17 | 114.02 5106.55 | 114.11 5149.9 | 114.05 |
| 5177.44 | 114.14 5207.72 | 114.02 5240.76 | 114.15 5297.65 | 114.18 5331.61 | 114.07 |
| 5382.58
5547.13 | 114.12 5403.82
114.06 5620.7 | 114.02 5435.67
114.09 5670.26 | 114.37 5467.51
113.91 5686.78 | 114.15 5515.29
114.61 5697.79 | 114.27
113.94 |
| 5703.29 | 114.8 5722.57 | 114.54 5733.58 | 114.73 5775.39 | 114.64 5813.42 | 114.68 |
| 5821.68 | 114.81 5865.73 | 114.67 5953.84 | 114.89 5992.38 | 114.9 6050.2 | 114.79 |
| 6131.04 | 114.96 6200.06 | 114.87 6215.39 | 115.06 6300.74 | 115.07 6331.03 | 115.23 |
| 6388.84
6496.22 | 115.2 6419.13
114.84 6512.74 | 115.35 6441.15
114.64 6534.77 | 116.26 6449.41
114.81 6556.79 | 115.26 6460.43
114.61 6636.64 | 114.95
114.8 |
| 6664.16 | 114.71 6688.95 | 114.85 6697.21 | 115.8 6708.22 | 115.32 6713.72 | 115.67 |
| 6724.73 | 117.62 6730.24 | 117.87 6746.76 | 116.41 6752.27 | 116.47 6760.53 | 118.09 |
| 6771.54 | 118.32 6788.06 | 113.76 6796.32 | 112.5 6810.09 | 113.08 6821.1 | 114.08 |
| 6840.37
6904.78 | 113.52 6859.64
111.15 6911.02 | 116.41 6867.91
107.78 6916.98 | 116.68 6884.43
106.75 6928.41 | 118.14 6895.43
102.71 6954.99 | 117.71
97.87 |
| 6961.75 | 97.6 6984.09 | 95.9 6992.99 | 94.98 7007.56 | 94.2 7021.5 | 93.85 |
| 7031 | 92.9 7040.5 | 90.71 7059.5 | 87.86 7088 | 85.59 7108.7 | 90.31 |
| 7129.39
7233.84 | 97.2 7139.74
106.74 7244.86 | 102.2 7143.88
113.38 7251.65 | 103.02 7224.48
118.14 7258.43 | 105.17 7231.27
119.32 7271.47 | 105.72
117.08 |
| 7298.29 | 116.82 7385.58 | 116.47 7411.66 | 116.63 7464.39 | 116.42 7583.98 | 116.5 |
| 7607.23 | 116.39 7698.56 | 116.46 7746.75 | 116.3 7819.84 | 116.31 7868.09 | 116.23 |
| 7923.51
8112.16 | 116.27 8005.86
118.36 8132.09 | 116.12 8022.46
118.53 8145.37 | 116.37 8039.07
119.98 8152.02 | 118.43 8085.58
119.77 8161.98 | 118.47
118.68 |
| 8210.4 | 117.88 8216.92 | 117.51 8321.25 | 117.03 8394.51 | 116.48 8448.39 | 116.16 |
| 8490.78 | 115.76 8513.59 | 115.36 8546.2 | 115.14 8562.5 | 114.64 8569.02 | 114.84 |
| 8601.62 | 114.66 8614.66 | 114.38 8676.6 | 114.02 8709.21
113.85 8800.5 | 114.07 8728.77
113.61 8826.57 | 113.79 |
| 8738.54
8862.44 | 113.98 8754.85
113.91 8908.08 | 113.73 8767.89
113.22 8924.38 | 113.85 8800.5
113.4 8937.42 | 113.01 8826.57 | 114.17
113.57 |
| 8956.99 | 113.35 8989.13 | 113.44 9002.42 | 115.29 9025.45 | 115.56 9071.09 | 114.57 |
| 9080.87 | 114.72 9126.5 | 114.47 9149.33 | 114.71 9178.67 | 114.56 9217.79 | 114.65 |
| 9253.66
9335.16 | 115.39 9260.18
115.07 9361.24 | 115.24 9282.99
115.88 9416.67 | 115.47 9289.51
116.37 9442.74 | 116.23 9309.08
116.96 9498.17 | 115.44
116.84 |
| 9556.85 | 116.81 9582.93 | 116.95 9605.75 | 116.8 9638.35 | 116.9 9700.01 | 116.77 |
| 9791.58 | 116.94 9849.5 | 116.84 9866.11 | 117.03 9879.39 | 115.74 9925.9 | 115.15 |
| 9945.83
10078.71 | 115.29 9983.92
115.1510120.85 | 115.1110015.59
115.2510168.39 | 115.2510038.84 | 115.1310072.07 | 115.42
115.21 |
| 10294.62 | 115.8410306.67 | 115.6310339.28 | 115.1210212.13
114.67 10351.1 | 115.2810268.05
118.1210357.74 | 118.62 |
| 10427.5 | 118.3110466.42 | 118.3110518.59 | 118.4510551.18 | 118.2410564.23 | 118.4 |
| 10600.08 | 118.3810632.69 | 118.2210645.73 | 118.3810678.33 | 118.2710710.93 | 118.38 |
| 10769.61
11076.07 | 118.2610825.04
118.3111181.57 | 118.3710854.37
118.34 11248 | 118.2510899.21
118.2911287.86 | 118.33 11023.9
118.33 11384.2 | 118.36
118.31 |
| 11437.94 | 118.211607.47 | 118.1711630.02 | 118.2711688.97 | 118.3211708.52 | 118.71 |
| 11731.35 | 118.5611749.61 | 118.0611874.79 | 117.811943.26 | 117.7411975.86 | 117.82 |
| 12005.39 | 117.7212089.97 | 117.6312122.57
117.8312483.74 | 117.7412204.71 | 117.6312236.68 | 117.53 |
| 12390.74
12533.58 | 117.5112463.81
119.2512553.51 | 117.0312403.74 | 117.7212497.03
117.7112633.24 | 117.2512520.29
117.6712659.81 | 118.19
117.37 |
| 12696.35 | 117.512751.78 | 117.2712781.13 | 117.1712794.17 | 116.6712830.02 | 116.34 |
| 12879.05 | 116.1312942.16 | 116.1412999.55 | 116.0313064.76 | 116.1513120.18 | 116.02 |
| 13154.77
13367.37 | 116.0813237.55
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116.2413390.62 | 116.4213330.82
116.2713397.26 | 116.4813350.75
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117.8 |
| 13427.16 | 117.9713443.77 | 117.0713450.41 | 117.7413473.66 | 117.8513480.31 | 117.51 |
| 13490.28 | 118.113510.21 | 118.5713543.43 | 120.0113550.07 | 119.99 13570 | 118.99 |
| 13616.51 | 119.17 13629.8 | 119.37 13676.3 | 119.6413712.84 | 119.7413732.78 | 119.94 |
| 13759.17
13827.64 | 119.9713785.26
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121.2513870.02 | 120.6813814.59
122.513889.58 | 117.45
124.01 |
| 13899.36 | 121.6513909.14 | 125.4813925.44 | 125.8713934.42 | 122.9313941.59 | 123.29 |
| 13954.15 | 120.5113973.87 | 119.3813982.83 | 119.9713998.97 | 119.8114009.72 | 120.19 |
| 14016.9
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122.19 |
| 14160.33 | 120.6414165.71 | 122.0414171.09 | 122.2814178.26 | 120.33 14192.6 | 119.46 |
| | | | | | |

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14206.95 121.0214214.89 121.0314226.02 123.0214248.18 123.1614298.38 122.88
Manning's n Values
                                               Sta n Val
           Sta n Val
                                                                                      Sta
                                                                                                  n Val
                                                                                                                                        n Val
                          .082 6895.43
                                                                                                    .015 7059.5
                                                                                                                                          .066 7258.43
                                                              .066 6961.75

        Bank Sta:
        Left Left Right 6895.43
        Lengths:
        Left Channel Right 21987.52
        Right 1987.52
        Right 1987.52
        Right 1987.52
        Right 1987.52
        Right 1987.52
        Right 1987.52
        Right 1987.53
        Right 1987.53

                                                                                                                                           Coeff Contr.
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | 1600 | 6713.72 | 115.67 | 7271.47 | 10633 | 117.08
                                                                                   2
RIVER: Rio Grande
                                                            RS: 181.70*
Description:
Station Elevation Data
          Sta E.c.
0 122.54
                                                          Elev
121.84
135.32
                                          Sta
8.75
65.57
                                                                                 Sta
15.3
                                                                                               ELEV Sta ELEV Sta ELEV 122.18 21.86 123.5 39.35 128.84 135.36 82.91 134.26 85.46 131.1 118.75 132.22 117.86 147.31 116.12 115.9 210.16 116.51 246.06 115.43 115.39 346 115.31 470.71 115.4
       89.91
                      121.52
                                            92.14
                                                            119.26
                                                                             112.18
                                                          115.53
115.8
115.77
114.99
                                                                            199.02
301.88
563.78
682.27
    164.49 116.18 181.21
267.53 115.93 284.7
    267.53
507.97
                                                                                                 115.33 585.25 115.58 598.14 115.03
114.98 739.82 115.12 766.9 114.98
                       115.37 538.02
114.82 642.18
       619.6
                      115.14 864.33
115.1 1053.25
                                                            115 887.15
115.15 1103.15
                                                                                                 115.18 951.73
115.37 1143.42
    795.63
                                                                                                                                        115.2
                                                                                                                                                       960.63
                                                                                                                                                                              115.5
  982.9
1173.47
                                                                                                                                      115.32 1321.4
113.25 1434.97
                       115.24 1216.41
                                                            115.32 1229.28
                                                                                                 115.17 1280.81
                                                                                                                                                                           115.14
                       114.66 1361.48
113.22 1463.91
                                                            114.53 1372.61
112.51 1470.59
                                                                                                 114.81 1385.97
113.03 1488.41
                                                                                                                                                         1512.9
   1452.78
                                                                                                                                       113.17
                                                                                                 113.11 1559.68
113.04 1657.66
113.78 1777.91
                                                                                                                                       112.63 1588.62
                       113.01 1537.4
112.81 1637.62
                                                            112.77 1550.77
112.81 1650.98
   1519 59
                                                                                                                                                                              113 2
                                                                                                                                       113.53 1664.34
   1604.21
  1671.02
                         113.2 1706.65
                                                            113.53 1748.8
                                                                                                                                       113.69 1804.61
                                                            113.53 1748.8
114.25 1877.61
117.68 1967.78
116.03 2100.87
112.87 2195.32
                                                                                               115.16 1886.2 115.27 1903.36

117.83 1989.24 116.71 2023.59

116.34 2113.76 115.4 2143.13

112.23 2208.21 112.58 2242.56

112.44 2435.77 112.46 2470.12

113.79 2608.56 114 2667.61

113.44 2880.25 113.63 2920.93

113.7 3127.02 113.7 3148.5
                       113.49 1856.14
                       116.75 1946.3
116.97 2070.82
114.52 2182.45
  1933.43
  2160.98
                                                           112.36 2339.1
113.31 2566.25
113.77 2800.72
113.58 3087.35
                       112.58 2289.79
112.93 2541.75
114.06 2717.68
    2281.2
2503.9
  2689 09
                                                                                                                                                                            113.53
                       113.69
                                        3000.5
                                                                                                113.84 3290.18
114.37 3517.74
114.85 3607.9
114.87 3783.93
115.57 3968.56
                                                                                                                                      114.05 3315.94
114.85 3526.32
114.75 3642.25
                       113.79 3195.73
                                                            113.95 3225.78
114.04 3500.56
  3182.84
                        114.14 3393.22
                       114.95 3560.67
114.88 3706.65
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                                                            114.72 3582.14
    3547.8
                                                                                                                                                                           115.12
                                                                                                                                    114.75 3642.25
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114.47 4174.64
115.01 4376.45
115.1 4483.62
                                                            115.14 3753.88
115.21 3947.09
  3668.01
                                                                                                                                                                                   115
                                                                                                114.66 4127.42
114.71 4329.21
115.45 4466.6
115.07 4630.6
115.01 4753.07
                                                            115 01 4082 78
  4038 24
                         115 4 4071 64
                       114.54 4213.29
115.01 4415.09
                                                            114.76 4256.47
114.9 4440.85
  4397.91
                                                                                                                                                                              115.5
                                                           114.97 4440.85
114.97 4565.35
115.11 4715.63
115.23 4937.91
115.49 5236.32
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117 5501.32
                       115.44 4531
114.68 4657.32
                                                                                                                                       114.77 4643.96
  4505.25
                                                                                                                                      115.16 4788.7
  4652.86
                                                                                                                                                                            115.07
                                                                                                115.01 4753.07 115.16 4788.7
115.11 5003.3 115.32 5059.12
115.58 5254.13 116.09 5260.81
115.49 5454.55 115.55 5461.23
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115.18 5577.03 114.89 5592.62
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101.58 5684.4 101.43 5705.57
                      115.12 4859.97
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  5084.88
  5312 03
                                                           117 5301.32
114.42 5561.44
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102.95 5677.99
                       115.03 5541.4
117.42 5621.57
104.43 5663.22
  5534.72
                                                                                                                                                                           116.43
  5652.81
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92.55 5846.81
                                                              94.33 5759.02
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                                                                                                   92.94 5777.02
99.43 5861.78
                                                                                                                                      91.25 5804.03
100.04 5945.09
    5727.8
  5828.24
                                                                                                99.43 5861.78
111.3 5973.16
113.68 6019.79
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113.23 6326.79
112.87 6551.27
                       105.5 5954.76
114.28 6003.28
                                                            106.55 5961.12
114.21 6009.88
113.45 6184.85
                                                                                                                                      115.47 5980.18
113.83 6075.91
  5951 59
                                                                                                                                      113.46 6207.95
113.07 6363.1
112.8 6722.92
  6106.52
                       113.32 6125.42
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                                                            113.11 6303.69
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                       113.04 6448.93
    6376.3
                      113.04 6448.93
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113.99 7251.09
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117.61 6861.56
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  6848.36
                                                                                                 120.12 6868.16
                                                                                                                                                                           117.52
                                                            116.61 6932.66
114.77 7162.68
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114.6 7227.48
113.24 7389.46
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  7036.33
                                                            113 57 7327 91
  7276 07
                       113.48 7282.55
                                                                                                                                        112.9 7421.86
                                                                                                 113.24 7389.46
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113.68 7713.24
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115.33 8043.89
                                                                                                                                     111.95 76255.12 112.51
115.1 7719.84 115.71
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115.11 8069.82 115.49
                       112.48 7538.5
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                                                            112.67 7619.49
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115.27 7998.54
                                                            114.86 7908.01
115.67 8017.98
                                                                                                115.91 8264.2 115.73 8294.23
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112.35 8700.26 111.9 8720.06
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                       115.52 8150.81
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115.74 8406.47
115.49 8561.62
                                                                                                                                                                           115.85
                       115 49 8555 01
  8522 01
                                                                                                                                                                           113 25
                       112.31 8630.93
                                                            112.04 8650.75
112.53 8782.79
                                                                                                 112 8815.8
111.99 8997.35
117.03 9060.08
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  8871.91
                       111.93 8951.14
111.54 9046.87
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115.4210324.38
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115.89 10080.1
115.52 10350.8
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                      116.5 9687.28
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  9598 15
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10185.74
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                                                            113.5911519.38
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                                                                                                                                       113.39 11565.6
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                                                           113.3311628.31
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                                                                                                113.0611658.02
113.0111945.22
                                                                                                                                      113.1311720.74
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11743.85 113.0911865.99
12021.14
                      114.212027.74
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113.2712080.56
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                                                            116.0112156.48
12275 32
                       118 4512298 44
                                                            118.4812311.64
                                                                                                118 8712338 04
                                                                                                                                       119.2512351.25
                                                                                                                                                                              119 2
                                                            119.6112413.97
119.1412508.25
                                                                                                 119.95 12440.2
118.9512527.68
                                                                                                                                       119.1112532.81
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                       120.6312495.28
                       119.2712550.35
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124.8 12618.1
                                                                                                121.9612579.52
121.6412625.68
                                                                                                                                      121.5912589.23 124.65
123.9612635.81 123.05
12605.43
                                                                  9.3412686.38 120.5812709.15 120.1612724.32 120.83 12112762.26 120.4512777.44 120.7612805.26 120.52
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120.3612673.74

119.3412686.38

111.8

111.91 983.65 112 1124.63

112 1124.63 111.88 1321.36 112.03 1432.84

114.25 1508.25

118.12 1573.83

115.98 1668.92 111.92 1741.05 112.21 1882.04

112.47 2023.03 112.77 2177.13

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115 03 3272 25

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109.56 5472.78

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114.77 7024.35 114.53 7227.73

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115.94 7762.41

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112.21 9983.15

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109.8610580.16 113.7710717.93

112.3410816.34 114.28 10839.3 114.43 116.710885.23 118.2810908.19 120.76

110.2610763.86 112.92

112 9231.97

4987.3

93.8 4596.05 93.8 4596.05 93.82 4635.05 94.09 4659.05 106.35 4682.24 111.38 4731.44

4347 7

116 22

2646

113.65

868.89

111.96

114.65 112.31

113.48

114.82

115.88

115.36

116.2

98.15

94.64

109 68

115 69

111.04

115 21

114.11

108 73

114.7

113.94 113.45

112.94

112.1

110 45

859.05

950.86 1098.4

1285.3

1406.61

114.21 1495.14

114.21 1495.14 117.93 1557.44 115.32 1659.08 112.84 1731.21 112.32 1839.41

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112.87 2331.24

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115.42 3875.55

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99.19 4447.05

96.43 4470.05 94.76 4495.05

93.83 4521.05 93.93 4561.05

93.93 4589.05 93.73 4627.05

94.13 4652.05

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109.75 5082.43 109.33 5256.29

109 1 5456 38

115.41 5564.63 116.36 5607.27

113.61 5810.65 112.58 5981.22

111.32 6214.12 110.12 6410.94 115.59 6469.98

115.59 6469.98 115.28 6634 115.08 6814.41 114.58 7001.39 114.66 7185.08

114.81 7290.05 109.4 7365.5

109.4 7365.5 109.64 7486.87 109.01 7673.84 110.68 7755.85 116.14 7860.82 115 8241.33

114.26 8454.55 113.64 8713.69

113.07 8913.78

112.78 9045 112.14 9215.57 111.91 9389.42 111.71 9605.92 111.81 9828.98 112.87 9950.35 111.2910071.72

110.5810206.21 110.4110314.46

11010550.64 111.6910711.37 110.07 10757.3

9045

112.78

3249.3

115.25

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Printed at 13:42 on 03 Oct 2017
 12817.9 120.8312853.31 120.6312871.02 121.4412883.66
12916.54
           122.712931.72
123.5512962.06
                               122.9812936.78
119.7612967.12
                                                  120.13 12939.3 120.1912944.36
119.112982.29 118.2112997.47
                                                                                           123.02
13002.53 121.0913013.73 120.8113029.43 121.6813060.86
                                                                       121.7413131.52
Manning's n Values
                               n Val Sta
.066 5677.99
           n Val Sta
.082 5621.57
                                                      .015 5861.78
                                                                         .066 5980.18
                               Lengths: Left Channel Right
1987.52 1916.67 1916.38
74.32 Elevation=135.363
        5621.57 5980.18
                                                                                   . 1
               Station=
                                               Elevation=135.3633
                    Station=12599.96
Right Levee
                                              Elevation=125.3867
Blocked Obstructions num=
Sta L Sta R Elev Sta L
                                            2
                                         Sta R
        L Sta R Elev Sta L 0 3393.22 114.04 5980.18
                                           9060 115.86
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                               RS: 181.35
Description: Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data
                              num=
Elev
             Elev Sta
116.03 13.12
125.19 111.48
     Sta Eie.
0 116.03
                                             Sta
                                                      Elev
                                                                 Sta
                                                                          Elev
                               114.97
135.26
                                                                      117.47 88.53
117.68 147.55
                                         22.95
118.04
                                                  115.48
133.65
                                                            32.79
124.6
                                                                                          134.01
   98.36
            135.19
                                                                                           116.79
            115.28
112.49
                     180.34
272.14
                                         193.45
285.26
  167.22
                                115.81
                                                    114.37 226.24
                                                                       113.02 242.63
                                                                                           111 93
  259.03
                                                              344.28
                                 112.3
                                                    111.63
                                                                      111.47
                                                                                   432.8
                                                                                           111.65
            111.5
111.25
                               112.09
111.48
                                         485.26
619.7
                                                   111.42 501.66
111.65 629.53
  442.64
                      465.59
                                                                        112.1
                                                                                  511.5
                                                                                           111.48
```

813.15

944.3 1082.01

111.92 1265.62 111.95 1390.22

112.83 1488.58

116.51 1541.04

116.75 1636.13 115.06 1721.38 112.66 1803.35

112.35 1941.06 112.61 2108.28

112.99 2285.33

113.13 2459.11

113.13.2459.11 113.52.2586.98 114.65.2747.64 114.4 2836.17 114.87 2970.6 115.4 3085.36 114.92 3242.74 115.83 3396.85

116.06 3478.82

115.76 3596.85

115.59 3823.09

115.87 4006.71 116.03 4147.69

116.11 4291.96 107.1 4377.21 102.73 4443.05

96.83 4463.05 94.82 4491.05

94.14 4520.05 93.96 4546.05

93.92 4584.05 93.65 4622.05 94.05 4649.05

94.09 4672.4 113.03 4711.76

110.72 4797.05 110.05 4911.86

109.96 5046.35 109.43 5233.32

108.85 5453.1 115.72 5544.95 119.65 5594.15 113.97 5705.68 112.62 5964.82

111.6 6204.28 110.54 6394.54

115.89 6437.18 115.16 6617.6 115.21 6791.45

114.91 6955.46 114.47 7142.44

114.9 7276.93 108.94 7355.66

108.76 7480.31 108.74 7654.16

108.5 7749.29 116.48 7831.29 115.19 8165.88

114.37 8385.66 113.66 8680.88

113.11 8880.98

112.65 9018.75

112.17 9186.05

111.97 9359.9 111.65 9586.24

111.52 9786.34 110.69 9888.03

113.9 9930.67

111.8610035.64

111 0310173 41

110.07 10291.5 110.04 10524.4

110.9910704.81 112.01 10740.9

5453 1

108 85

111.67

111.62 111.88

112.09 112.17

111.61

112.02 112.07

111.48 724.62 112.11 927.91 111.85 1032.83 112.04 1242.67 111.94 1370.54

111.65 1472.19

115.86 1531.21

116.11 1629.57 114.55 1704.98 112.35 1796.79

112.49 1914.83 112.82 2091.88

112.8 2268.94

113.05 2442.71

113.31 2567.31 113.97 2741.09

114.65 2809.94

114.47 2944.37 114.77 3068.97

115.09 3206.68

115.39 3360.78 116.53 3465.7

116.05 3587.02

115.44 3760.8

116.01 3987.03 116.32 4121.46

116.42 4239.5 116.43 4373.93 105.25 4427.05

97.26 4458.05 94.83 4485.05

94.47 4512.05 94.13 4545.05

93.83 4582.05 93.63 4613.05 93.93 4644.05

93.93 4668.05 112.52 4701.92

110.83 4764.24

110.04 4905.3

109.78 5023.39 109.66 5184.12

108 9 5439 98

108.9 5439.98 115.51 5518.71 120.27 5584.31 113.97 5663.04 113.04 5932.02

111.49 6178.04 110.91 6378.14

114.91 6430.62 115.28 6584.79

115.03 6725.84

115.03 6725.84 114.82 6896.42 114.62 7112.92 114.14 7267.09 109.33 7335.97

109.1 7447.5

108.96 7575.43 108.5 7742.73

117.01 7795.21 115.53 8146.2

114.67 8375.82 113.95 8641.52

113.28 8835.06 112.75 8985.95

112.38 9136.84

112.38 9130.84 111.9 9287.74 111.79 9550.16 111.92 9769.94 112.06 9874.9

116.74 9924.11

109.9510429.27

110.2710698.25 112.9510734.34

114.810793.38 115.1810809.78 113.4510855.71 115.2410875.39

11110157 01

714.78

993.48

1200.05

1341.04

1449.24

1600.06

1767.28

1891 88

2193.53

2370.58

2518.13

2790.27

2921.42 3055.85

3193 56

3446.03

3744.4

4085.4

4232 94

4407.05

4483.05

4505.05 4533.05

4635.55

4685.52

4741.28

4872.49

4997.14

5167.72 5410 46

5577.75 5640.08 5876.25

6161.64 6332.21

6424 06

6696.32

7037.47

7260.53

7424.54

7726.33

8037.95

8297.09 8575.92

8789.13

8949.87

9130.28

9517.35 9756.81

9861.78 9910.99

10140 61

10406.31

10724.5

10780.26

```
10914.75 120.6410934.43 117.4510957.39 117.7510980.36
11019.72
11095.17
              118.9911032.84
                                   118.93 11039.4
120.0711144.37
                                                          119.411052.52 119.2711075.48
120.4611170.61 120.611177.17
                                                                                                     119.48
                                                                               116.5711259.18
120.3511311.57
11200.13
               120.911213.26
                                    120.3 11223.1
                                                         117.1611229.66
11269.02
            123.7911285.42
                                   124.9211291.98
                                                         124.4611301.78
11314.84
             124.8211324.64
                                   123.95 11337.7
                                                         120.2111350.76
                                                                                120.111373.62
                                                                                                       119.3
             121.1911419.33
121.4711481.37
                                   120.5211438.92
121.03 11487.9
                                                         121.4711445.45
120.59 11507.5
                                                                               122.8211451.99
121.0211543.42
11461.78
                                                                                                     120.59
11559.74
             121.0211579.33
123.3211670.77
                                   120.6711589.13
                                                         120.8911605.46
                                                                               120.4811628.32
                                                          122.8511706.69
  1716.48 119.7211723.01
11752.4 118.2211771.99
                                                         124.8311739.34 121.5511745.87 119.19
119.7611798.12 121.1611807.91 120.65
120.111909.14 120.1911964.65 120.05
                                   123.9911732.81
116.9611791.58
11716.48
 11847.1 120.1611873.22 120.3311883.02
Manning's n Values
      Sta n Val Sta n Val Sta
0 .085 111.48 .066 1082.01
                                                         n Val Sta
.066 4387.05
                                                                                n Val Sta
Bank Sta: Left Right 4347.7 4701.92
                                   Lengths: Left Channel
                                   Right
                                                                                  Coeff Contr.
Ineffective Flow num= 2
Sta L Sta R Elev Permanent 0 4347.7 116.8 T
4701.9211964.65 113.03 T
Left Levee Station= 111.48
Right Levee Station=11285.42
                                                   Elevation= 135.26
Elevation= 124.92
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                   133 20
                                                    Element
                                                                                       Left OB
                                                                                                     Channel
                                                                                                                    Right OB
  Vel Head (ft)
                                                    Wt. n-Val.
                                                                                         0.066
                                                                                                        0.035
  W.S. Elev (ft)
Crit W.S. (ft)
                                    133.17
                                                    Reach Len. (ft)
Flow Area (sq ft)
                                                                                      1561.05
                                                                                                    1691.80
12068.72
                                                                                                                    1675.24
                             118.93
0.000042
235000.00
11846.41
                                                   Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                                                     81822.09
                                                                                                    12068.72
                                                                                                                   141895.80
                                                                                                     34117.03
                                   235000.00
                                                                                      64919.68
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                      354.22
                                                                                                                    7262.73
                                                                                      4229.46
                                                                                       2.83
16.35 34.07
10010440.0 5200
1241.31
                                         1 09
                                                                                                         2 83
                                                                                                                        1 02
                                                                                                                       18.43
  Conv. Total (cfs)
Length Wtd. (ft)
                                                    Conv. (cfs)
Wetted Per. (ft)
                                   36236380.0
                                                                                                         5260755.0
                                                                                                                         20965180.0
                                                                                                                     7295.34
  Min Ch El (ft)
                                                                                      0.04
                                     93.63
                                                                                                       0.09
                                                    Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                        0.05
                                                                                          0.04
                                                                                                         0.24
  Frctn Loss (ft)
                                                                                     300592.60
                                                                                                                    303336.90
                                                                                                     90559.00
                                         0.07
                                                    Cum Volume (acre-ft)
                                                                                     29192.33
  C & E Loss (ft)
                                         0.00
                                                    Cum SA (acres)
                                                                                                     3470.83
                                                                                                                  30875.04
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

6041.61

RIVER: Rio Grande RS: 181.01* REACH: Lower Reach

Description: 460 Station Elevation Data num= Sta 12.1 Elev 115.95 133.65 Sta Elev 21.17 116.59 92.49135.0159 Sta Elev Sta 116.43 30.24 118.27 102.08135.0478 39.44 108.74 165.78 74.95 131.89 81.66 133.97 123.32 122.9 115.81 199.33 135.76 121.22 153.76 118.34 165.78 112.38 237.82 112.19 261.83 177.78 114.93 111.74 112.01 328.07 459.94 111.71 111.87 352.22 468.95 111.5 111.47 291.87 315.86 111.47 405.91 111.54 444.93 577.01 787.13 426.92 483.95 111.68 488.95 111.47 488.95 111.68 655.05 111.53 682.1 112.03 865.18 111.69 871.18 112.11 990.74112.1036 1006.25 112.16 1176.94 111.99 1210.37 112.14 1312.43 112.28 1327.44 541.3 745.11 111.56 111.68 111.46 111.79 607.02 835.16 111.9 901.2 1030.27 112.02 910.2 963.71 111.86 1099.31 112.03 1273.41 112.11 1159.34 112.27 1288.42 1228.39 113.61 1369.47 116.37 1441.51 113.65 1381.47 115.17 1465.52 114.71 1402.49 114.96 1492.53 1348.45 112.68 1363.46 1411.49 116.18 1426.5 1498.54 1576.59 114.43 1519.55 112.88 1585.59 114.91 1528.56 112.3 1594.59 114.04 1540.56 112.72 1615.44 113.99 1561.57 112.54 1631.53 112.77 1792.45 1699.92 112.48 1732.68 1816.58 112.77 1868.89 1977.5 113.09 1993.59 112.71 1753.69 112.79 1891.76 113.4 2001.65 112.63 1776.36 113.02 1915.78 113.04 2037.85 1699 92 112 63 113.33 2090.15 114 2134.4 114.06 2251.07 113.86 2146.48 113.54 2263.14 114.18 2198.77 113.57 2279.23 114.22 2218.89 114.55 2303.37 2239 114.3 2319.46 113.6 2369.04 115.04 2516.12 113.55 2411.07 114.64 2531.13 113.77 2423.07 114.63 2540.13 113.66 2464.29 114.36 2548.77 2510.12 115.08 2615.18 115.25 2717.74 114.82 2629.23 115.09 2669.46 114.63 2774.27 2573 16 114.66 2597.17 114.64 2701.65 114.79 2810.3 114.82 2629.23 114.73 2741.88 114.77 2870.62 115.53 2947.05 112.91 3077.45 2798.28 115.3 2825.3 114.86 2894.75 2914.86 2975.39 115 2922.91 112.84 3023.49 115.55 2943.02 112.81 3047.62 115.23 2959.11 113.24 3110.47 3125.47 113.35 3137.48 113.52 3218.52 113.2 3155.49 112.95 3256.83 113.61 3173.5 113.1 3284.57 113.24 3185.51 112.84 3293.57 3347.6 3482.11 112.83 3361.42 113.04 3500.69 112.97 3397.63 112.9 3526.37 112.82 3425.79 112.98 3566.59 112.88 3441.88 112.87 3587.74 113 1 112.92 3719.82 113.39 3860.9 115.8 3964.87 3605.75 113.03 3650.77 112.98 3740.83 113.4 3763.72 113.39 114.23 3881.91 116.42 3980.96 113.87 3875.9 115.64 3972.92 3779.82 113.56 3816.02 114.81 3936.71 3916.6 3984.31 116.19 3990.44 104.89 4041.48 114.1 4006.23 103.58 4050.78 107.26 4011.05 101.82 4061.87 105.94 4021.09 100.91 4083.28 4029.6 101.82 4061.87 100.91 4083.28 93.92 4137.44 93.38 4156.7 93.84 4236.61 95.23 4244.6 105.15 4332.74107.1704 4342.21 112.38 4387.12 112.33 4393.52 111.8 4569.54 112.11 4585.54 11.25 4735.94 111.28 4748.74 110.8 4905.56 110.86 4993.19 94.83 4113.5294.29431 4118.97 92.68 4185.29 92.36 4204.64 4105.72 92.07 4164.69 4260.58 98.92 4270.97 101.79 4328.03 112.3 112.77 4364.72 112.21 4468.32 113.37 4374.32 112.17 4551.2 4425.52 111.4 4700.74 110.87 4868.88 4652.73 111.29 4678.34 111.05 4835.15 4819.15 110.77 5116.76 114.93 5209.57 114.84 5142.36 115.31 5219.17 114.69 5161.57 117.79 5225.57 5084.76 110.27 5100.76 114.59 5206.37 5235 17 115 22 5247 97 114.87 5254.37 114.25 5279.97 112.84 5564.79 113.59 5314.33 113 4 112.56 5596.78 111.67 5804.8 112.88 5510.38 112.09 5701.07 112.38 5690.71 111.33 5955.2 5788.8 5612.78 112 5804.8 5891.21 111.33 5955.2 112.5 6044.81 111.22 6000.01 113.87 6051.21 110.95 6016.01 114.52 6057.61 110.68 6032.01 110.75 114.31 6089.61 114.07

113.97 6182.42 114.02 6201.62 113.9 6249.62 113.85 6275.22 113.96 113.8 6339.22 113.84 6425.63 113.68 6435.23 113.81 6512.53 113.7

```
6526.35 114.09 6540.17
6608.04 115.47 6629.94
6671.38 115.42 6681.73
                                             115.04 6547.07
                                                                           115.2 6560.88
 6608.04
6671.38
                                             115.28 6640.3
                                                                         115.64 6650.66
114.86 6716.27
                                                                                                     115.53 6664.47
114.59 6726.63
                                                                                                                                 115.81
                                                                         114.04 6809.5 113.93 6826.77
114.31 6889.65 111.63 6908.85
  6764.61
                 114.28 6774.97
                                             113.87 6788.78
                                                                                                                                 114.12
  6860.85
                 113.91 6867.25
                                             114.36 6876.85
  6918.45
                 110.62 6934.45
                                             110.38 6953.66
                                                                         110.66 7001.66
                                                                                                      110.1 7020.86
                                                                                                                                 110.36
                110.62 6934.45
110.05 7075.27
109.91 7196.24
109.7 7331.28
115.34 7393.06
114.56 7558.81
113.57 7879.95
112.78 8135.47
  7043.26
7189.34
                                             110.64 7081.67
110.03 7237.68
                                                                         110.08 7120.28
110.12 7264.07
                                                                                                     109.94 7161.67
109.87 7289.67
                                            110.03 7237.68
109.63 7337.68
114.78 7448.32
114.3 7641.69
113.22 7948.91
112.79 8156.2
112.45 8370.29
111.74 8425.53
                                                                        110.12 7264.07

111.14 7344.08

114.59 7517.38

113.94 7690.03

113.07 8004.26

112.7 8228.71

113.81 8380.64

112.32 8442.79
                                                                                                     114.65 7350.48
114.44 7524.28
113.8 7744.1
  7315.28
  7538.09
                                                                                                     112.89 8049.15
112.78 8259.78
112.74 8394.45
  8087.13
                 112.4 8342.66
111.73 8415.17
  8294.31
                                                                                                                                 112 36
  8401.36
                                                                                                     112.43 8456.61
                                                                                                                                 113.11
  8473.73
                 113.48 8508.94
113.3 8784.15
                                             113.05 8576.14
113.33 8793.75
                                                                         113.45 8646.55
113.17 8838.56
                                                                                                     113.35 8684.95
113.24 8937.76
                                            113.33 8793.75
113.15 9129.77
113.42 9308.99
113.55 9411.38
116.75 9465.79
113.42 9622.6
112.66 9779.41
112.5 9913.81
                                                                                                    113.24 8937.76
113.05 9195.57
113.4 9366.59
113.56 9433.79
113.75 9542.6
113.03 9686.6
                 113.29 9094.57
113.09 9296.18
113.76 9398.58
                                                                         113.18 9178.29
113.19 9324.99
112.66 9424.19
  8979.37
                                                                                                                                   113.1
 9283.38
9379.38
                                                                                                                                 114.59
                 113.76 9398.36
116.18 9446.59
113.19 9603.4
112.77 9750.6
112.36 9869.01
                                                                         114.19 9484.99
113.22 9670.61
  9440.19
   9568.2
                                                                         112.39 9811.41
112.39 9952.22
                                                                                                     112.41 9817.81
112.5210070.62
   9702.6
  9840.21
                 112.36 9869.01
112.6910214.63
114.6210249.84
115.8610307.44
115.0210368.24
119.8110445.04
                                                                         113.7610227.43
112.6910272.24
10138.27
                                            113.2710221.03
113.9910256.24
                                                                                                     115.1610233.83
                                                                                                     112.810278.64
115.5510352.23
118.2410419.44
117.9810502.65
                                                                         114.2810329.83
10294.64
                                             116.1410323.43
                                                                                                                                 115.66
                                            116.2110387.44
117.7210467.44
118.7710547.45
10358.64
                                                                         117.1910397.04
117.9510489.85
10425.84
                 118.7910541.05
119.5810649.33
                                                                                                     119.1310601.86
120.5910717.06
10528 25
                                                                         119 0810582 65
                                                                         119.9610704.25
10624.25
                                               119.910675.45
                 117.6110732.21
124.5610792.86
                                            116.9510746.03
124.1510800.92
                                                                         119.8210756.38 120.9210771.46
120.6110808.98 12310819.73
10726.66
                                                                                                                                 123.65
                                                                                                     120.6410897.64
                 121.3810845.07
121.1810919.14
120.9510970.19
10830.48
                                             121.0310860.03
                                                                         119.9610873.46
                                                                                                                                 120.23
                                             122.2610924.52
120.9 10977.6
                                                                         122.5510932.57
120.6110999.75
 10913.76
                                                                                                      121.4710948.69
10954.06
                                                                                                     120.5311013.18
                                                                                                                                 120.89
                 120.6711050.79
121.9811134.09
                                            120.9311058.25
122.5811139.46
                                                                                                     122 6511104 53
11029.44
                                                                         121.4811083.03
11117.96
                                                                         119.8411142.14
                                                                                                     119.9311147.52
11155.58 123.4511166.33
                                             119.8211187.82
                                                                         118.1711203.94
                                                                                                     119.9311209.32
                                             119.611271.11 119.7111279.18 119.5611346.34 119.85
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .085 102.08 .066 3980.96
                                                                         n Val
                                                                                                     n Val Sta
.025 4364.72
                                                                            .066 4113.52
Bank Sta: Left Right
                                            Lengths: Left Channel Right
                                                                                                       Coeff Contr.
                                                                                                                                 Expan.
                                             1561.05 1691.8 1675.24
            3980.96 4364.72
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 3980.96 116.68
4364.7211346.34 113.37 T
                       Station=99.50333
Station=10787.46
                                                                  Elevation=135.0533
Left Levee
Right Levee
                                                                  Elevation= 124.56
CROSS SECTION
RIVER: Rio Grande
                                         RS: 180.66*
REACH: Lower Reach
```

| INPUT | | | | | | | | | |
|---------------------------------|--------|----------|---------|---------|---------|----------|---------|---------|--------|
| Description | 1: | | | | | | | | |
| Station Elevation Data num= 460 | | | | | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 1 | 16.82 | 11.08 | 116.92 | 19.39 | 117.7 | 27.7 | 119.07 | 36.12 | 120.96 |
| 44.31 1 | 23.54 | 68.64 | 131.76 | 83.971 | 34.8208 | 92.671 | 34.8288 | 99.44 | 134.29 |
| 104.89 1 | 28.96 | 112.3 | 128.48 | 140.31 | 121.4 | 156.11 | 117.59 | 181.67 | 116.45 |
| 207.24 1 | 12.18 | 221.85 | 111.63 | 240.1 | 111.41 | 265.66 | 111.94 | 287.44 | 111.47 |
| 298.53 1 | 11.93 | 320.44 | 111.45 | 346 | 111.18 | 356.96 | 111.41 | 378.87 | 111.43 |
| 393.47 1 | 12.09 | 404.59 | 111.66 | 426.4 | 111.46 | 448.25 | 111.52 | 459.21 | 111.3 |
| 492.07 1 | .11.53 | 524.48 | 111.48 | 551.73 | 111.71 | 595.32 | 111.57 | 619.88 | 111.72 |
| 638.13 1 | .11.67 | 700.22 | 111.72 | 747.68 | 111.93 | 786.05 | 111.77 | 818.75 | 111.99 |
| 846.28 1 | 11.95 | 875.49 | 112.22 | 899.471 | 12.2081 | 915.65 | 112.2 | 933.92 | 111.92 |
| 998.58 1 | 12.18 | 1036.16 | 112.26 | 1069.03 | 112.09 | 1079.99 | 112.25 | 1115.74 | 112.11 |
| 1153.01 1 | 12.36 | 1205.65 | 112.17 | 1243.79 | 113.06 | 1254.68 | 113.64 | 1273.76 | 113.88 |
| 1281.93 1 | 14.43 | 1295.56 | 114.61 | 1309.18 | 113.94 | 1330.98 | 113.8 | 1355.5 | 113.98 |
| 1360.95 1 | 13.53 | 1380.02 | 113.83 | 1388.2 | 113.43 | 1418.16 | 113.62 | 1439.96 | 112.67 |
| 1452.45 1 | 12.96 | 1467.06 | 112.71 | 1481.67 | 112.99 | 1492.62 | 112.81 | 1507.22 | 112.96 |
| 1543.74 1 | 12.72 | 1576.61 | 112.93 | 1613.12 | 112.99 | 1627.73 | 112.75 | 1649.64 | 113.06 |
| 1697.12 | 112.9 | 1719.02 | 113.24 | 1755.54 | 113.17 | 1766.49 | 113.44 | 1795.7 | 113.31 |
| 1810.31 1 | 13.85 | 1817.62 | 113.22 | 1839.53 | 113.41 | 1850.48 | 113.77 | 1897.95 | 113.9 |
| 1912.55 1 | 15.08 | 1923.51 | 115.16 | 1938.11 | 114.68 | 1949.08 | 115.4 | 1981.94 | 115.15 |
| 1996.55 1 | 15.36 | 2014.8 | 114.4 | 2033.06 | 114.96 | 2044.01 | 113.7 | 2054.97 | 113.83 |
| 2069.57 | 115.8 | 2091.49 | 115.28 | 2106.1 | 113.82 | 2151.09 | 113.73 | 2179.12 | 113.88 |
| 2219.3 1 | 13.86 | 2237.56 | 114.15 | 2255.81 | 115.11 | 2277.72 | 115.49 | 2292.33 | 114.47 |
| 2306.93 1 | 14.26 | 2339.8 | 115.05 | 2358.17 | 115.26 | 2372.67 | 115.05 | 2387.27 | 115.49 |
| 2401.88 1 | 15.14 | 2423.78 | 115.18 | 2431.09 | 114.77 | 2453.01 | 115.68 | 2467.61 | 114.82 |
| 2489.52 1 | 14.58 | 2529.68 | 114.65 | 2551.62 | 115.21 | 2565.24 | 114.8 | 2595.42 | 114.53 |
| 2628.28 1 | 15.13 | 2646.54 | 115 | 2653.84 | 116.02 | 2661.14 | 116.33 | 2672.1 | 116.07 |
| 2675.75 1 | 15.44 | 2683.05 | 112.27 | 2694.02 | 110.94 | 2719.57 | 110.23 | 2745.13 | 110.21 |
| 2759.74 1 | 10.51 | 2767.04 | 110.32 | 2810.86 | 110.93 | 2848.61 | 110.64 | 2876.59 | 110.67 |
| 2887.55 1 | 10.29 | 2905.82 | 110.43 | 2927.71 | 109.97 | 2956.93 | 110.24 | 2990.28 | 109.78 |
| 3015.35 1 | 10.12 | 3051.87 | 110.41 | 3084.74 | 110.16 | 3110.3 | 110.31 | 3124.91 | 110.64 |
| 3135.86 1 | 10.46 | 3161.42 | 110.6 | 3179.67 | 110.36 | 3201.59 | 110.39 | 3230.8 | 110.07 |
| 3238.11 1 | 10.21 | 3256.36 | 109.84 | 3273.65 | 110.04 | 3314.52 | 109.97 | 3377.19 | 110.15 |
| 3417.03 1 | 10.66 | 3431.65 | 111.11 | 3464.51 | 110.69 | 3486.42 | 110.96 | 3518.86 | 112.04 |
| 3548.49 | 112.9 | 3555.81 | 113.33 | 3574.06 | 115.3 | 3581.36 | 115.44 | 3599.62 | 114.77 |
| 3606.92 1 | 16.19 | 3614.23 | 116.57 | 3623.88 | 114.21 | 3630.32 | 111.51 | 3639.98 | 106.83 |
| 3646.42 1 | 05.49 | 3663.8 | 104.48 | 3675.91 | 101.91 | 3685.39 | 99.54 | 3695.21 | 99.21 |
| 3705.02 | 98.17 | 3714.83 | 96.61 | 3734.46 | 94.61 | 3756.989 | 2.93158 | 3773.72 | 92.22 |
| 3783.54 | 91.52 | 3793.35 | 90.32 | 3802.35 | 91.37 | 3811.34 | 90.81 | 3829.33 | 90.85 |
| 3847.32 | 92.2 | 3856.32 | 92.14 | 3874.31 | 92.56 | 3883.3 | 92.5 | 3892.3 | 93.57 |
| 3901.29 | 95.45 | 3910.29 | 97.99 | 3919.29 | 102.2 | 3921.98 | 102.93 | 3986.22 | 105.18 |
| 3989.17 1 | .06.38 | 3993.081 | 09.5014 | 3995.07 | 111.09 | 4002.19 | 112.75 | 4027.53 | 113.7 |
| 4036.89 1 | 13.25 | 4055.6 | 113.07 | 4074.66 | 113.25 | 4084.77 | 113.66 | 4101.6 | 113.94 |
| 4128.53 | 114.1 | 4155.46 | 113.94 | 4165.56 | 114.11 | 4175.66 | 113.77 | 4209.33 | 113.56 |
| 4227.21 1 | 13.84 | 4242.81 | 113.66 | 4259.83 | 113.71 | 4286.76 | 113 | 4308.33 | 112.79 |
| 4333.3 1 | 12.85 | 4389.45 | 112.68 | 4414.7 | 112.53 | 4428.17 | 112.63 | 4488.77 | 112.29 |
| 4519.07 1 | 12.24 | 4542.63 | 112.34 | 4640.27 | 111.86 | 4684.03 | 111.89 | 4714.33 | 111.65 |
| 4742.02 1 | 11.82 | 4760.74 | 114 | 4829.38 | 113.76 | 4851.22 | 114.12 | 4860.58 | 115.3 |
| 4866.82 1 | 15.13 | 4876.18 | 114.08 | 4894.9 | 113.57 | 4919.87 | 113.2 | 4950 | 113.12 |
| 4953.37 1 | 12.94 | 4982.27 | 112.95 | 5054.36 | 112.83 | 5074.56 | 112.72 | 5165.46 | 112.62 |
| | | | | | | | | | |

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112.5 5228.75
                                                                     112.26 5320.33
  5415.96
                 111.84 5431.56
                                           111.86 5515.8
113.03 5737.78
                                                                       111.62 5578.2
112.74 5795.01
                                                                                                  111.53 5653.08
112.77 5818.44
                                                                                                                             111.28
                                                                       112.46 6000.39
112.54 6135.04
  5865.25
                 112.59 5899.38
                                            112.69 5949.88
                                                                                                 112.38 6046.21
                                                                                                  113.4 6148.52
116.08 6214.69
                 112.57 6104.75
                                            112.25 6121.58
  6155.25
                 115.72 6161.98
                                             114.9 6168.72
                                                                       114.88 6195.65
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116.41 6300.01
                                           116.67 6256.24
115.2 6320.22
                                                                       116.45 6269.71
114.7 6330.32
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114.77 6353.88
  6286.54
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111.63 6646.77
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113.68 6476.78
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113.81 6489.26
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112.33 6518.85
                 111.91 6582.81
111.21 6704.01
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                                            111.5 6617.18
111.29 6828.57
110.65 6919.83
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                                                                                                  111.29 6663.61
                                                                                                                              111.66
 6683.81
6879.26
                                                                                                 110.92 6854.3
111.6 6932.31
                                                                                                 113.36 7033.94
112.97 7108
                                           113.67 6980.07
113.12 7074.34
                                                                       113.19 6986.8
112.95 7101.27
  6938.55
                  113.8 6957.27
                                                                                                                             113 17
  7044.04
                 112.86 7057.51
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111.61 7656.76
111.92 7804.89
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                                                                      112.95 7101.27
112.67 7222.47
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                                                                                                  112.43 7306.63
111.8 7491.79
  7121.47
                 113.27 7141.67
112.18 7404.27
                                                                                                                             112.12
                 111.51 7619.73
111.83 7794.79
111.5 7922.73
                                                                                                 111.63 7724.1
  7575.97
                                                                                                                              111.51
                                                                                                  111.4 7899.16
112.32 7956.39
   7764.5
7905.9
                                                                                                                              111.59
  7963.13
8033.82
                 110.36 7976.59
114.09 8043.92
                                           110.39 7986.69
114.15 8050.65
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                                                                                                  111.79 8016.99
113.35 8094.43
                 114.29 8185.32
114.43 8389.38
                                           114.29 8239.61
114.51 8468.12
                                                                       114.47 8276.22
114.44 8508.52
                                                                                                  114.39 8299.79
114.49 8526.67
  8161.75
                                                                       114.66 8720.61
114.75 8835.54
115.65 8982.2
                                                                                                  114.59 8737.45
114.92 8916.67
116.77 9000.91
                 114.58 8629.72
114.63 8777.85
                                           114.66 8692.02
114.76 8823.07
  8599.42
  8935.39
                 115.04 8947.87
                                            114.63 8969.72
                                                                                                                              115.52
                                                                       115.09 9135.07
114.73 9344.12
  9019.63
                 115.3 9075.8
115.09 9263
                                            115.39 9100.76
114.87 9323.25
                                                                                                  115.21 9153.79
114.87 9365.96
   9216.2
                 114.87 9437.72
114.99 9639.73
                                                                                                   114.9 9531.99
115.4 9723.9
  9394.04
                                           114.79 9488.23
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116.75 9765.33
116.91 9821.49
116.59 9880.78
118 9999.34
119.1310154.83
120.4710220.86
120.88 10259.2
                                            114.79 9488.23
                                                                       115.01 9508.43
                                                                       115.17 9683.49
  9562.29
                                                                                                  115.4 9723.9
115.31 9787.17
116.21 9843.33
117.67 9930.69
118.7710089.81
119.25 10188.5
                 115.82 9749.73
116.23 9809.01
                                                                       115.96 9771.57
117.09 9837.09
  9737.25
  9865.17
                 116.88 9871.42
                                                                       117.19
                                                                                   9899.5
                                                                                                                              119.03
                 118.99 9955.65
119.07 10138
                                                                      118.16 10055.5
119.3510164.93
10111.07
                119.8610212.07
117.81 10249.1
                                                                      120.210230.22
121.34 10273.9
120.7410316.62
10201.96
                                                                                                  118 0510235 64
                                                                                                   123.52 10289.5
10294.02
                 123.7610300.06
                                            120.8710303.06
                                                                                                  123.3510323.25
                                            120.6210366.36
                                                                       120.7610479.38
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120.0710572.02
                                           120.3110466.61
122.4310529.12
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10425.13
                                                                                                  120.6710492.94
                                                                                                                             121.11
10501.98
                                                                                                  121.1110561.49
120.4510603.65
10620.52 120.4810642.13
                                             119.310652.14
                                                                      119.0410678.31
                                                                                                  119.0210728.04 119.65
Manning's n Values
                                           n Val
                                                                      n Val Sta
.025 4027.53
        Sta n Val Sta
0 .085 83.97
                                              .066 3630.32
                                                                                                      .066
                                           Lengths: Left Channel
                                                                                                      Coeff Contr. Expan.
                            Right
                                                                                     Right
Bank Sta: Left
Sail 4.23 4027.53 1561.05 1691.8 1675.24
Left Levee Station=87.52667 Elevation=134.8467
Right Levee
                           Station=10289.51
                                                               Elevation=
Blocked Obstructions num=
Sta L Sta R Elev Sta L
                                                          Sta R
    Sta L Sta R Elev Sta L Sta R Elev
0 2661.14 116.33 4259.8310728.04 113.71
                                                                          Elev
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                          RS: 180.32
Description: RGV-03, New Cross-Section, Begin Wall, Bathymetric elevations translated from IBWC 2008 Cross-sections
| Translated 1: | Station Elevation Data | Sta | Elev | Sta | 0 | 117.22 | 6.56 | 62.33 | 131.64 | 75.45 | 141.05 | 118.81 | 157.45 |
                                           num=
                                                           460
                                                         Sta Elev Sta
22.96 119.47 32.8
98.41 134.59 101.69
164.01 117.98 177.14
                                          Elev
117.47
                                                                                                               42.64 124.52
124.65 125.34
                                                                                        32.8 121.26
                                                                                                  134.06
114.92
                                            118.43
                                                                                                                186.98
                             216.5
311.63
403.48
521.57
                                           111.3
                                                         239.46
321.47
                                                                                    259.14 111.47
341.15 111.24
     200.1
                 111.25
                                                                       112.14
                                                                                                                268.98
   288.67
                                                                       111.29
                  111.4
                                                                                                                354.27 112.19
                111.39
111.73
                                           111.59
111.73
                                                         413.32
541.25
                                                                       111.2
111.57
                                                                                    442.84
557.65
741.35
                                                                                                  111.5
111.77
   373.95
                                                                                                                462.52
   492.04
                                                                                                                574.05
   629.82
                 111 71
                              672 46
                                            111 87
                                                          718.38
                                                                       111 83
                                                                                                  112 01
                                                                                                                761 03
                 112.33 823.35
112.38 1000.49
                                           112.3 839.76
112.18 1036.57
                                                                       111.96 931.6
112.48 1069.38
                                                                                                  112.42 961.13
112.24 1079.22
   970.97
                 112.37 1134.98
112.59 1269.47
                                            112.63 1141.54
112.97 1279.31
                                                                       112.51 1164.5
112.84 1305.56
                                                                                                  112.86 1174.35
113.2 1318.68
  1108.74
  1216.99
                 113.23 1341.64
113.22 1463.01
                                            112.9 1354.76
112.86 1482.69
                                                                       113.3 1387.56
113.36 1525.34
                                                                                                 112.95 1417.09
113.01 1545.02
   1331.8
                                                                                                                              113.16
  1449.89
                 113.22 1403.01
113.35 1587.66
113.69 1663.11
116.25 1741.83
                                                                       113.52 1627.02
114.21 1705.75
                                            113.76 1613.9
114.22 1695.91
                                                                                                   114.3 1633.59
                                            115.49 1751.68
                                                                                                  116.45 1781.2
  1728.71
                                                                       116.63 1774.64
                116.25 1741.83
116.5 1810.72
117.05 1879.61
113.98 2010.82
114.4 2073.14
  1794.32
1859.92
                                            115.05 1827.12
116.26 1892.73
                                                                       115.85 1836.96
114.05 1918.97
                                                                                                  113.86 1846.8
113.85 1958.33
                                                                                                                             114.04
  1994.42
                                            114.35 2027.22
114.16 2079.7
                                                                       115.72 2037.06
114.61 2089.55
                                                                                                  116.08 2046.9
114.63 2102.67
                115.47 2132.19
114.9 2204.36
114.55 2292.92
                                            115.28 2145.31
116.12 2217.48
                                                                       115.89 2158.43
114.91 2237.16
                                                                                                  115.31 2178.11
114.53 2250.28
                                                                                                                               115.5
114.7
  2115 79
  2273.24
                                            115.11 2332.29
                                                                       114.22 2342.13
                                                                                                   114.4 2361.81
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116.49 2391.33 109.73 2420.86

107.74 2512.7 107.9 2594.71

106.94 2699.68 107.75 2807.93

107.8 2903.06

107.22 3040.83 108.35 3188.44

113.9 3240.93 106.4 3280.29

105.21 3647.69

114.04 3736.25 115.84 3824.82

3350

3490

96.76 91.06

89 16

2378.21

2411.01

2479.9 2575.03

2657.04

2771.85 2857.13

3113 3217.97 3263.89

3330

3450

3573

3788.74

115 2384.77 110.85 2414.29

108.07 2486.46 107.77 2584.87 107.39 2683.28

107.5 2794.81

107.83 2876.82

107 2994.91 107.98 3132.68

115.04 3234.37 111.53 3273.73

104.06 3644.41

113.36 3690.33 116.03 3814.98

115.64 3893.71

97.36

89.16 89.76

3340

3410

3470

115.64 3893.71 115.5 3916.67 114.3 4001.96 114.29 4067.56

116.99 2401.17 108.8 2443.82

108.1 2525.82 107.21 2607.83 107.03 2709.52 108.17 2817.77

107.3 2909.62

107.33 3070.35 111.23 3195.01

115.95 3247.49 105.21 3298

106.9 3650.97

114.48 3746.1 116.03 3834.66

115.58 3926.51

3360

3500

95.46

90.56 93.56

116.61 2404.45 107.63 2466.78

108.57 2548.79 107.39 2630.79 107.48 2742.32

107.91 2840.73

107.54 2926.02 107.93 3083.48

111.85 3211.41

116.45 3257.33 104.06 3320

110.71 3654.25

115.12 3762.5 115.56 3867.47

3370

3520

114.99 3942.91 114.51 114.11 4139.73 113.73

95.06 88.56

90 16

107.86

90 16

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113.58 4287.34
112.89 4487.43
112.47 4612.08
  4169.25 113.68 4192.21 113.81 4202.05 113.65 4234.85
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4500.55
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                                             113.03 4392.3
                                                                                                                                  113.02
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112.28 4949.94
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                 112.59 4710.48
                                             112.47 4736.73
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                 112.35 4848.25
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                                             112.11 5081.15
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                                                                                                     111.88 5238.59
                                                                                                                                  111.77
                 111.81 5356.68
111.29 5563.33
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111.09 5612.54
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111.02 5625.66 111.16 5697.82 111.48
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113.63 5979.92
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112.76 6196.41
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111.97 6567.07
111.7 6658.92
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  6242.33
6317.78
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112.52 6373.54
                                            112.52 6373.54
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114.65 7718.42
115.83 7898.83
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111.89 7518.33
111.15 7577.37
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                                                                                                     110.83 7524.89
113.37 7583.93
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                                                                       113.96 7626.57
115.21 7741.38
115.7 7948.03
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  7829 95
                 115.51 7852.91
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                 115.89 8056.28
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                 115.89 8056.28
116.15 8220.29
116.22 8318.7
116.52 8531.92
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117.26 8961.63
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117.87 9240.46
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  8902.59
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117.88 9351.99
                                                                         117.64 9158.45
117.97 9309.34
  9053 48
  9201.09
  9368.39
                 117.96 9381.51
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                                                                                                      118.36 9542.24
                 117.96 9381.51
118.46 9601.29
118.62 9693.13
117.54 9742.34
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118.43 9617.69
118.73 9706.25
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123.51 9801.38
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9670.17
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121.76 9771.86
120.09 9811.22
                                                                         119.34 9716.1
121.95 9762.02
119.96 9804.66
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9791.54
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                123.8 9824.34
121.24 9883.39
120.67 9939.15
120.67 9985.08
                                             123.21 9840.75
121.77 9889.95
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121.54 9899.79
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120.01 9919.47
   9814 5
                                                                                                                                  120 05
  9866.99
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121.36 9945.71
120.07 9998.2
  9929.31
                                                                         122.73 9952.28
                                                                                                      122.93 9958.84
                                                                         120.4910011.32
                                                                                                      121.3510017.88
                 120.2 10047.4 118.7710053.96 118.4810073.65
     10031
                                                                                                      118.4710109.73 119.45
Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta
0 .085 75.45 .066 3247.49 .025 3690.33
                                                                                                       n Val
                                                                                                        .066
Bank Sta: Left Right Lengths: Left Channel Right 3247.49 3690.33 557.41 674.61 694.11

Left Leve Station= 75.55 Elevation= 134.64
Right Levee Station= 9791.55 Elevation= 123.84
Blocked Obstructions
                                                                                                         Coeff Contr.
                                                                                                                                   Expan.
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | O | 2391.33 | 116.99 | 3814.9810109.73 | 115.84
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                                132.98
                                                                  Element
                                                                                                               Left OB Channel Right OB
                                                                 Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                                                0.066
557.41
                                                                                                                                   0.025
674.61
                                                                                                                                                       0.066
694.11
    Vel Head (ft)
                                                    0.09
                                                 132.89
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                              56923.34 15140.55
66923.34 15140.55
62128.41 65762.60
                                                 120 12
                                                                                                             56923.34
                                                                                                                                                    105066 30
                                                                                                            56923.34
    E.G. Slope (ft/ft)
                                             0.000050
                                                                                                                                                   105066.30
   O Total (cfs)
                                             235000.00
                                                                   Flow (cfs)
                                                                                                                                  65762.66
                                                                                                                                                     107108.90
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                  Top Width (ft)
Avg. Vel. (ft/s)
                                             10004.96
                                                    1.33
                                                                                                               1.09
18.11
                                                                                                                                      4.34
                                                                                                                                                          1.02
    Max Chl Dpth (ft)
                                                   44.33
                                                                  Hydr. Depth (ft)
                                                                                                                                    34.19
                                                                 Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                             33392910.0
   Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                8828292.0
                                                                                                                                     9344710.0
                                                                                                                                                          15219910.0
                                                 660.32
88.56
                                                                                                                             452.47
0.10
                                                                                                              3148.39
                                                                                                                                                     6437.51
   Min Ch El (ft)
                                                                                                                   0.06
   Alpha
                                                    3 45
                                                                                                                    0.06
                                                                                                                                       0 45
                                                                                                                                                          0.05
    Frctn Loss (ft)
                                                                  Cum Volume (acre-ft)
                                                                                                            293090.80
                                                                                                                                  89003.72
3424.40
                                                                 Cum SA (acres)
                                                                                                                                                   30085.75
   C & E Loss (ft)
                                                    0.01
                                                                                                            28795.58
Warning: The cross-section end points had to be extended vertically for the computed water surface

    Warning: The conservation ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
    Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                             RS: 180.3
INPUT
Description: RGV-03, Bathymetric elevations translated from IBWC 2008
                      Cross-sections
Station Elevation Data
Sta Elev Sta
0 114.96 16.12
87.04 132.3 96.71
                                            Elev
115.3
135.32
                                                                 Sta
                                                          22.57
103.16
                                                                        116.44 45.13 118.72
136.17 112.83 135.64
                                                                                                                   48.35 119.31
128.95 130.68
   145.12 126.35
214.01 111.05
                              161.52
                                              120.3
                                                           174.65
                                                                         118.61
                                                                                      184.49
                                                                                                    118.02
                                                                                                                   194.33
                                                                                                                                  116.74
                                                                                      387.88
505.98
719.21
906.2
                               220.57
440.37
                                             110.27
111.16
                                                           381.32
460.05
                                                                                                     111.85
                   111.4
    420.68
                                                                           111.6
                                                                                                                    555.19
                                                                                                                                  111.66
    568.31
                 111.81
111.99
                               617.52
843.87
                                             111.63
111.92
                                                           679.85
886.52
                                                                         111.88
                                                                                                     111.79
112.03
                                                                                                                   722.49
935.73
    817.63
                                                                         112.37 1152.24
112.65 1273.62
                                             112.44 1093.19
112.76 1267.06
                                                                                                     112.59 1175.21
112.84 1312.99
   978.37
                 112.28 1050.55
  1352 36
                 112.95 1375.32
113.02 1463.89
                                             112.87 1391.72
                                                                           113.1 1414.69
                                                                                                     112 93 1421 25
                                                                                                                                  113 23
                                             114.1 1477.02
113.31 1660.73
                                                                                                     113.19 1742.74
  1618.08
                 113.08 1644.32
                                                                           113.1 1709.93
                 113.56 1768.98
115.22 1851
                                             113.36 1795.23
114.13 1864.12
                                                                         114.12 1808.35 113.86
114.26 1873.96 114.86
```

113.86 1818.19

114.3 1939.57

1883.8

1828.03

1890.36

115.68 1896.92

116.21 1916.61

115.62 1923.17

```
116.65 2031.43 116.86 2057.67
  2100.32
                     114.63 2129.84
                                                       115.21 2133.12
                                                                                         114.58 2156.09
                                                                                                                        114.74 2179.05
116.44 2270.91
                                                                                                                                                            114.16
                     115.25 2316.83
                                                                                        115.45 2339.8
115.17 2428.37
  2293.87
                                                       115.69 2323.39
                                                                                                                            115.5 2349.64
                                                                                                                                                              115.1
                                                       114.75 2402.13
114.63 2480.86
                                                                                                                          115.35 2448.05
   2375.88
                     115.09
                                          2389
                     114.42 2471.02
                                                                                         114.32 2497.26
  2464.46
                                                                                                                          115.45 2507.1
                                                                                                                                                               116.8
  2513.66
2559.59
                     116.13 2523.51
106.24 2585.84
                                                       116.93 2536.63
106.14 2621.92
                                                                                        117.32 2539.91
106.77 2641.6
                                                                                                                          116.83 2549.75
106.47 2654.73
                                                                                         108.09 2703.93
109.29 2772.82
  2671.13
                     106.14 2677.69
                                                       106.63 2687.53
                                                                                                                          109.37 2723.62
                                                       109.54 2756.42
  2822.03
                     109.18 2828.59
                                                       108.82 2848.28
                                                                                          108.6 2867.96
                                                                                                                          109.03 2884.36
                     106.97 2900.76
105.98 2982.78
                                                                                         106.16 2940.13
106.73 3018.86
                                                       106.24 2910.61
   2966.37
                                                       106.63
                                                                      2995.9
                                                                                                                          107.82 3035.27
                                                       111.88 3071.35
   3045.11
                     109.76 3064.79
                                                                                         111.68 3074.63
                                                                                                                          110.21 3077.91
                     105.21 3087.19
                                                       103.18 3107.19
                                                                                          97.18 3117.19
                                                                                                                            97.28 3127.19
   3081.19
                                                      94.98 3157.19

94.98 327.19

98.48 3227.19

90.48 3287.19

93.48 3347.19

105.55 3422.34
   3137.19
                       95.38 3147.19
90.08 3217.19
                                                                                          93.68 3177.19
89.98 3237.19
                                                                                                                            92.08 3197.19
89.08 3257.19
                                                                                          90.08 3307.19
96.98 3357.19
                                                                                                                          90.08 3317.19
102.98 3360.19
117.51 3435.46
                       89.98 3277.19
90.98 3337.19
   3267.19
                                                                                                                                                               89.68
                                                                                        114.89 3428.9
116 3478.1
116.82 3592.91
   3409.22
                     105.21 3412.5
                                                                                                                                                            117.22
  3442.02
3527.31
                     115.89 3448.58
116.84 3569.95
                                                       115.55 3468.26
117.39 3583.07
                                                                                                                          115.61 3514.18
115.96 3609.31
                                                                                                                                                            116.43
                     115.94 3635.55
115.54 3691.31
                                                       116.17 3645.39
115.11 3714.27
                                                                                         116.77 3651.95
115.27 3724.11
                                                                                                                          115.72 3661.79 116.26
115.07 3766.75 114.9
   3619.15
   3668.35
                                                      115.11 3714.27
115.03 3832.35
115 3947.15
114.54 4088.2
114.37 4281.72
113.95 4403.09
                                                                                        115.08 3858.59
114.77 3973.39
114.73 4134.12
                                                                                                                          114.71 3874.99
114.72 4006.19
   3773.31
                     115.16 3786.43
                                                                                                                                                           114.66
                     114.96 3911.07
114.58 4058.67
                                                                                                                          114.45 4163.64
114.23 4344.05
113.85 4465.41
  4035.71
                                                                                                                                                            114.53
  4176.76
                     114.42 4225.96
114.16 4373.57
                                                                                         114.1 4321.08
114.09 4426.05
  4350.61
                                                                                         113.73 4560.54
113.48 4763.91
                     113.75 4494.93
113.52 4724.55
                                                      113.9 4511.34
113.39 4757.35
  4485 09
                                                                                                                         113.82 4593.34
                                                                                                                                                            113 55
                                                                                                                             113.3 4783.59
  4698.31
                                                                                                                                                            113.43
                    113.39 4931.2
113 5082.09
112.86 5370.75
                                                      113.19 4950.88
113.06 5118.17
112.77 5475.72
                                                                                                                        113.12 5013.21
112.8 5314.99
113.28 5531.48
                                                                                        113.25 4990.25
112.89 5187.06
  4888.56
                                                                                                                                                            113.16
                                                                                        112.84 5505.24
114.77 5597.09
114.52 5787.34
113.46 5915.27
  5351.07
                                                                                                                                                            113.46
  5547.88
5669.25
                       113.18 5561
114.8 5715.17
                                                      112.77 5473.72
114.49 5583.97
114.49 5757.82
113.89 5898.86
113.3 5967.75
                                                                                                                          114.37 5603.65
114.27 5820.14
                    113.83 5872.62
113.67 5961.19
  5856 22
                                                                                                                          113.73 5931.67
                                                                                         113.54 6000.55
                                                                                                                          113.23 6007.11
   5944.79
                     112.94 6043.19
  6020.23
                                                        113.2 6069.44
                                                                                         113.02 6082.56
                                                                                                                          112.71 6092.4
                                                                                         112.36 6167.84 112.66 6200.64
                                                      112.42 6249.85
111.81 6328.57
111.64 6397.46
111.36 6528.67
110.7 6581.15
                                                                                        112.12 6266.25
111.86 6335.13
111.3 6407.3
                    112.2 6220.33
112.13 6315.45
111.59 6394.18
                                                                                                                          112.1 6272.81
111.55 6364.66
111.63 6456.5
    6207.2
                                                                                                                                                            111.69
  6292.49
    6374.5
                     111.15 6476.18
110.73 6571.31
                                                                                        111.15 6551.63
111.36 6597.55
                                                                                                                          110.92 6558.19
111.72 6607.39
  6463.06
                                                                                                                                                            110.32
  6561.47
                                                                                                                          111.68 6666.43
108.79 6738.6
113.81 6781.24
115.88 6837.01
114.45 6896.05
                                                       113.29 6653.31
                                                                                         113.58 6659.87
108.05 6732.04
  6620 51
                     111.43 6640.19
                                                                                                                                                            111.43
                     109.18 6702.52
                                                       108.11 6718.92
                                                                                       108.05 6732.04
112.88 6768.12
118.88 6827.16
113.71 6882.93
115.44 6968.21
119.6 7033.82
120.01 7158.47
120.24 7227.35
120.037 7332.32
                    112.09 6751.72
119.39 6807.48
113.33 6859.97
                                                       112.72 6761.56
119.32 6814.04
112.96 6876.37
  6745.16
                                                                                                                                                            117.62
                                                                                                                                                            114.52
  6850.13
                     114 6932.13
118.93 7004.3
119.88 7112.54
                                                                                                                          118.03 6981.33
119.38 7066.62
                                                      114.58 6948.53
118.8 7027.26
  6912.45
  6987.89
                                                      118.8 7027.20
119.56 7151.91
119.92 7217.51
119.87 7302.8
121.08 7401.2
   7079 74
                                                                                                                          119.77 7174.87
                    120.19 7207.67
119.92 7269.99
                                                                                                                          120.43 7338.88
  7247.03
                                                                                                                                                            120.24
                                                                                                                          120.43 7338.88
121.45 7427.44
121.46 7479.93
117.47 7634.1
117.87 7837.47
117.95 7968.68
                                                                                        120.37 7332.32
120.81 7411.04
121.14 7466.81
117.88 7598.01
117.61 7798.11
                       120.3 7384.8
122.29 7450.4
                                                       121.89 7460.25
   7437.28
                     122.29
                     119.43 7512.73
117.53 7696.42
117.77 7896.51
                                                      119.22 7542.25
117.72 7745.62
117.96 7906.35
  7499.61
7680.02
  7880.11
8086.77
                                                                                        117.81 7945.72
118.18 8178.61
                     118.01 8122.85
                                                             118 8155.65
                                                       118.12 8322.94
                                                                                        118.31 8339.34
118.3 8565.68
118.42 8693.61
  8290.14
                     118.27 8303.26
                                                                                                                          118.24 8411.51
                                                                                                                                                            118.38
                                     8496.8
                                                       118.38 8506.64
118.56 8670.65
                                                                                                                          118.55 8588.64
118.57 8736.26
                     118.21
                     118.55 8641.13
    8611.6
                                                                                                                                                            118.58
                                                                                       118.42 8893.61
118.65 8811.7
119.49 8880.59
117.38 8975.72
118.1 9106.93
118.44 9379.19
                                                      118.42 8782.18
119.65 8877.31
117.57 8942.91
117.98 9067.56
  8746.1
8847.78
                     118.38 8775.62
119.07 8860.91
                                                                                                                          118.27 8828.1
119.06 8896.99
                       118.3 8919.95
118.03 9061
                                                                                                                          117.79 8982.28
118.11 9152.85
  8903 55
                     118.03
                     118.27 9300.46
  9241.42
                                                       118.45 9343.11
                                                                                                                          118.59 9438.23
                                                                                                                                                            118.52
                     118.69 9526.8
118.97 9700.66
                                                       118.62 9556.32
                                                                                         118.8 9618.65
119.09 9766.26
                                                                                                                          118.89 9625.21
119.27 9792.5
  9658.01
                                                       118.93 9743.3
                    119.54 9825.31
120.13 9864.67
                                                      120.61 9828.59
120.69 9874.51
  9805.62
                                                                                         120.31 9838.43
                                                                                                                          117.45 9841.71
                                                                                        123.17 9884.35 123.94 9894.19
  9854.83
                                                                                                                                                            123.92
  9897.47 123.46 9904.03
9933.55 122.95 9949.96
                                                      120.31 9907.31
118.99 9956.52
                                                                                        119.67 9913.87
                                                                                                                          122.8 9920.43
121.85 9986.04
  9933.55
                                                                                         118.55 9972.92
    9992 6 121 9110005 72
                                                       119 410012 28 119 85 10025 4 119 4410028 69
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .157 3064.79 .066 3087.19
                                                                                        n Val
                                                                                                                          n Val Sta
.066 3422.34
                                                                                          .015 3360.19
                                                                                                                                                                .074
Bank Sta: Left Right Lengths: Left Channel 3064.79 3422.34 1062.5 1652.05 Left Levee Station= 103.16 Elevation= Pight Levee Station= 920.42 Elevation= 920.42 Elevation= 103.16 Elevation= 103.1
                                                                                                                            Coeff Contr.
                                                                                                                                                               Expan.
                                                                                                           1250
                                                                      Elevation=
                                 Station= 9920.43
Right Levee
                                                                               Elevation= 124.01
CROSS SECTION OUTPUT Profile #Design Flow
                                                 132.93
    E.G. Elev (ft)
                                                                                                                                      Left OB Channel
                                                                                Element
                                                                                                                                                                                   Right OB
                                                                                Wt. n-Val.
Reach Len. (ft)
                                                                                                                                     0.157
1062.50
                                                                                                                                                            0.031
1652.05
                                                                                                                                                                                    0.074
    W.S. Elev (ft)
                                                                               Flow Area (sq ft)
Area (sq ft)
    Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                           122 23
                                                                                                                                  49947.86
49947.86
                                                                                                                                                          13136.63
                                                                                                                                                                                  96729 72
                                                      0.000120
                                                                                                                                                         13136.63
                                                                                                                                                                                  96729.72
                                                                                                                                      34145.29
    O Total (cfs)
                                                      235000.00
                                                                                 Flow (cfs)
                                                                                                                                                            73796.41
                                                                                                                                                                                   127058.30
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                               Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                                                             357.55
                                                                                                                                                                                    6606.35
                                                              1.47
                                                                                                                                           0.68
                                                                                                                                                                  5.62
                                                                                                                                                                                          1.31
    Max Chl Dpth (ft)
                                                                                                                                                                36.74
6739463.0
                                                                               Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
    Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                       21461390.0
                                                                                                                                        3118322.0
                                                                                                                                                                                          11603610.0
                                                        1337.30
                                                                                                                                                             368.08
                                                                                                                                                                                    6624.54
                                                                                                                                           0.13
                                                                                                                                                                0.27
                                                               5.05
                                                                                                                                           0.09
                                                                                                                                                                  1.50
                                                                                                                                                                                          0.14
    Alpha
    Frctn Loss (ft)
                                                                                                                                   292407.00
                                                                                                                                                            88784.76
                                                                                                                                                                                   287160.30
    C & E Loss (ft)
                                                               0.02
                                                                               Cum SA (acres)
                                                                                                                                  28756 64
                                                                                                                                                            3418 20
                                                                                                                                                                                29981 97
```

Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

| CROSS SECTION | | | | |
|---|----------------------------------|---------------------------------|----------------------------------|------------------|
| RIVER: Rio Grande
REACH: Lower Reach | RS: 180.08* | | | |
| INPUT
Description: RGV-03, | | | | |
| Station Elevation Data | num= 460 | _ | _ | _ |
| Sta Elev Sta | Elev Sta | Elev Sta | Elev Sta | Elev |
| 0 117.21 8.53 | 117.38 16.88 | 116.32 23.63 | 117.07 47.25 | 118.78 |
| 59.69 121.5 68.22 | 124.93 79.59 | 128.42 99.49 | 134.99 108.01 | 136.08 |
| 120.76 134.27 141.66 | 127.34 160.58 | 124.53 184.98 | 119.47 208.1 | 118.09 |
| 221.41 116.31 234.72 | 113.32 254.22 | 108.29 262.87 | 107.38 420.18 | 107.4 |
| 431.77 107.31 474.89 | 107.43 483.54 | 107.55 496.52 | 108.33 501.32 | 108.32 |
| 512.91 109.83 552.77 | 110.05 567.42 | 110.39 573.13 | 110.84 588.34 | 111.35 |
| 595.94 112.38 616.85 | 112.23 652.98 | 112.31 706.21 | 112.15 721.42 | 112.29 |
| 757.54 112.22 831.69 | 112.28 873.51 | 112.53 890.62 | 112.34 913.43 | 112.43 |
| 957.16 112.43 979.98 | 112.84 987.58 | 112.47 1095.95 | 112.46 1126.36 | 112.66 |
| 1181.5 112.61 1210.01 | 112.84 1257.54 | 112.78 1265.15 | 113.06 1280.36 | 112.72 |
| 1314.58 111.11 1357.57 | 111.16 1413.81 | 111.11 1491.7 | 111.27 1521.99 | 111.39 |
| 1556.6 111.31 1586.88 | 111.4 1643.14 | 111.32 1651.79 | 111.46 1703.72 | 111.38 |
| 1755.64 111.54 1785.93 | 111.48 1807.56 | 111.65 1837.85 | 111.53 1846.51 | 111.75 |
| 1885.44 111.6 1902.75 | 112.4 1938.17 | 112.35 1947.68 | 112.58 1993.3 | 112.7 |
| 2016.12 112.58 2073.16 | 112.81 2103.58 | 112.68 2130.19 | 113.44 2156.81 | 113.46 |
| 2162.51 113.18 2177.72 | 113.35 2183.42 | 112.7 2187.22 | 113.22 2198.63 | 113.23 |
| 2244.26 112.54 2270.54 | 112.42 2292.17 | 112.73 2305.15 | 112.53 2339.77 | 113.21 |
| 2357.07 113.07 2370.05 | 113.3 2383.03 | 114.1 2413.33 | 113.24 2430.63 | 113.33 |
| 2443.61 113.8 2456.59 | 113.48 2465.24 | 114.42 2473.89 | 114.84 2499.86 | 114.4 |
| 2508.51 113.4 2530.14 | 114.39 2547.45 | 114.55 2569.09 | 115.14 2582.07 | 114.78 |
| 2608.03 115.55 2625.33 | 115.56 2638.33 | 115.25 2651.3 | 115.42 2685.91 | 113.73 |
| 2707.54 113.54 2744.27 | 113.95 2755.67 | 114.3 2767.08 | 114.31 2781.1 | 114.78 |
| 2785.43 114.3 2803.2 | 114.63 2831.72 | 114.47 2843.13 | 114.22 2864.04 | 114.67 |
| 2869.74 114.29 2888.76 | 114.73 2903.96 | 114.43 2913.47 | 113.52 2923.89 | 113.73 |
| 2936.28 114.78 2949.59 | 115.58 2964.8 | 116.04 2972.4 | 115.41 2985.72 | 113.51 |
| 2997.45 113.1 3027.73 | 113.37 3036.38 | 113.18 3058.03 | 113.22 3080.77 | 113 |
| 3109.29 113.46 3128.3 | 112.81 3135.9 | 113 3145.41 | 115.62 3151.11 | 116.15 |
| 3162.52 115.83 3170.12 | 114.89 3191.03 | 113.62 3222.45 | 112.78 3244.08 | 112.61 |
| 3265.71 113.36 3278.69 | 114.4 3287.34 | 113.92 3300.33 | 114.53 3317.64 | 114.99 |
| 3321.96 114.69 3334.94 | 110.12 3347.92 | 106.86 3382.54 | 106.82 3413.47 | 107.29 |
| 3430.13 107.81 3455.29 | 107.67 3468.6 | 108.3 3487.61 | 108.2 3495.04 | 107.76 |
| 3506.62 107.69 3516.13 | 108.48 3538.3 | 109.36 3557.95 | 109.85 3577.25 | 108.99 |
| 3598.88 109.04 3607.53 | 108.75 3629.16 | 108.97 3651.11 | 108.39 3670.13 | 108.59 |
| 3700.54 108.65 3710.05 | 108.16 3728.69 | 108.02 3754.65 | 108.65 3776.28 | 107.99 |
| 3784.93 107.3 3797.91 | 106.84 3827.92 | 108.12 3845.03 | 107.84 3852.63 | 107.21 |
| 3867.85 106.85 3873.55 | 107.26 3888.76 | 106.67 3906.09 | 107.77 3923.39 | 107.53 |
| 3942 107.88 3949.61 | 108.58 3957.21 | 108.52 3970.52 | 108.92 3989.54 | 110.88 |
| 3999.04 111.53 4014.25 | 112.04 4022.47 | 111.44 4026.58 | 109.81 4032.64 | 105.42 |
| 4034.8 104.62 4059.43 | 99.08 4067.37 | 97.45 4092.43 | 96.72 4104.96 | 95.67 |
| 4117.49 95.33 4142.9 | 93.41 4172.79 | 91.9 4192.66 | 90.02 4205.19 | 88.06 |
| 4215.67 89.39 4226.15 | 89 4235.95 | 89.31 4253.53 | 91.81 4268.07 | 92.49 |
| 4278.55 92.22 4299.52 | 92.25 4310 | 91.97 4320.48 | 92.96 4330.96 | 94.85 |
| 4341.44 97.49 4351.92 | 102 4355.07 | 102.75 4366.03 | 102.94 4383.61 | 104.77 |
| 4406.46 106.24 4409.89 | 106.65 4420.21 | 114.14 4426.01 | 116.1 4431.81 | 115.87 |
| 4437.62 114.87 4443.42 | 114.61 4460.83 | 114.93 4469.53 | 114.63 4501.45 | 114.75 |
| 4513.06 115.54 4533.44 | 115.87 4550.78 | 115.96 4571.09 | 114.86 4585.59 | 115.22 |
| 4594.3 114.85 4608.8 | 115.02 4617.51 | 115.47 4623.31 | 114.69 4632.01 | 115.08 |
| 4637.82 114.51 4658.13 | 114.15 4678.44 | 114.29 4687.14 | 114.15 4730.66 | 114.2 |
| 4742.27 114.07 4782.88 | 114.03 4820.6 | 113.64 4826.4 | 113.84 4867.72 | 113.74 |
| 4883.9 114.29 4900.05 | 114.28 4921.6 | 113.89 4943.14 | 112.63 4959.31 | 112.52 |
| 4970.08 113.03 4986.25 | 114.73 4997.02 | 115.55 5009.2 | 115.57 5023.95 | 115.25 |
| 5075.93 114.83 5153.24 | 114.79 5174.79 | 114.64 5215.19 | 114.74 5261.62 | 114.58 |
| 5287.74 114.73 5308.04 | 114.59 5336.41 | 114.7 5352.57 | 114.91 5383.49 | 114.71 |
| 5465.7 114.59 5508.79 | 114.82 5572.08 | 114.71 5601.1 | 114.79 5606.9 | 114.67 |
| 5638.08 114.88 5697.35 | 115 5754.88 | 114.75 5794.31 | 114.81 5826.62 | 115.16 |
| 5837.39 114.99 5858.95 | 114.25 5880.5 | 115.03 5912.81 | 114.47 5977.45 | 114.41 |
| 5998.99 114.8 6009.77 | 114.3 6020.54
114.82 6300.37 | 114.84 6036.69 | 114.46 6094.36 | 114.33
115.83 |
| 6343.9 115.52 6349.7 | 115.73 6407.73 | 115.81 6448.34 | 115.62 6332.29
115.57 6486.07 | 115.59 |
| 6512.18 115.4 6541.2 | 115.4 6573.11 | | 115.1 6610.83 | 114.76 |
| 6625.34 114.96 6651.46 | 114.9 6665.96 | | 114.8 6718.19 | 114.36 |
| 6738.5 114.56 6761.72 | 114.43 6773.32
113.88 6848.76 | 114.19 6782.03 | 114.36 6799.43
113.7 6941.61 | 114.12
113.4 |
| 6959.02 113.73 6996.73 | 113.27 7022.85 | 114.1 6935.81
113.43 7104.09 | 113.22 7109.9 | 112.93 |
| 7121.5 113.09 7167.93 | 112.93 7188.24 | 112.75 7194.04 | 112.29 7214.35 | 113.06 |
| 7228.86 113.33 7237.56 | 112.91 7249.17 | 113.12 7266.58 | 114.51 7278.18 | 114.73 |
| 7283.98 113.31 7289.79 | 113.12 7321.71 | 110.64 7336.22 | 110.58 7347.82 | 111.13 |
| 7353.63 111.91 7359.43 | 113.6 7373.94 | 114.18 7379.74 | 114.88 7391.34 | 117.73 |
| 7400.05 119.05 7414.55 | 118.99 7420.36 | 118.6 7431.96 | 116.41 7440.67 | 115.38 |
| 7452.28 114.5 7460.98 | 114.22 7475.49 | 114.79 7481.29 | 115.34 7492.9 | 115.39 |
| 7507.41 115.01 7524.81 | 115.44 7539.32 | 116.09 7556.73 | 118.03 7574.14 | 118.71 |
| 7588.65 118.6 7608.96 | 119.19 7614.76 | 119.03 7655.38 | 119.43 7684.4 | 119.18 |
| 7719.22 119.5 7739.53 | 119.36 7754.04 | 119.66 7768.54 | 119.47 7777.25 | 119.7 |
| 7785.95 119.43 7794.66 | 119.63 7823.67 | 119.4 7852.69 | 119.76 7904.92 | 119.7 |
| 7925.23 120.29 7939.73 | 120.11 7948.44 | 120.61 7971.65 | 121.32 7983.25 | 121.06 |
| 7991.97 120.53 7997.77 | 120.79 8009.37 | 120.34 8026.78 | 119.17 8038.39 | 119.05 |
| 8064.5 118.03 8113.82 | 117.67 8145.75 | 117.8 8186.36 | 117.68 8200.87 | 117.84 |
| 8244.39 117.75 8290.82 | 117.97 8325.64 | 117.88 8386.57 | 117.89 8421.39 | 118.01 |
| 8441.7 117.95 8578.07 | 118.04 8607.09 | 118.15 8627.39 | 118.04 8681.47 | 118.19 |
| | 118.07 8769.57 | 118.17 8833.41 | 118.25 8879.83 | 118.11 |
| | 118.37 8990.09 | 118.24 9036.52 | 118.35 9062.63 | 118.24 |
| 9082.94 118.35 9120.67 | 118.34 9129.37 | 118.18 9155.48 | 118.17 9161.29 | 118.35 |
| 9187.4 118.07 9201.91 | 118.25 9230.93 | 119.11 9245.43 | 118.99 9248.34 | 118.67 |
| 9262.84 118.58 9268.64 | 118.08 9283.15 | 117.52 9303.46 | 117.35 9332.48 | 117.66 |
| | 117.85 9407.92 | 117.8 9489.17 | 118.01 9543.3 | 118 |
| | 118.22 9741.6 | 118.18 9761.92 | 118.31 9819.94 | 118.22 |
| 9846.06 118.37 9936.01 | 118.45 9973.73
119.6910086.89 | 118.4110031.76 | 118.6810054.97
116.9610110.11 | 118.66
119.32 |
| 10118.81 119.7310127.51 | 121.5710136.22 | 122.1410147.82 | 121.9610153.63 | 119.76 |
| 10218.96 117.8810224.22 | | | 121.2610209.72
120.5310262.77 | 118.38
120.67 |
| | 119.6810299.58 | | | 119.12 |
| Manning's n Values
Sta n Val Sta | num= 5
n Val Sta | n Val Sta | n Val Sta | n Val |
| | .066 4059.43 | | .066 4420.21 | |
| Bank Sta: Left Right
4014.25 4420.21 | 1062 E 1 | | Coeff Contr. | Expan. |
| Left Levee Station= | 108.01 Ele | evation=136.0775 | .1 | . 3 |
| Right Levee Station=1
Blocked Obstructions | LU1/U.JJ E16 | evation=122.9425 | | |
| | | | | |

Sta L Sta R Elev Sta L Sta R Elev 0 2339.77 113.21 4420.21 7539.32 116.09

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 179.85*

| INPUT | | | | | | | | |
|----------------------|----------------------------------|------------------------|-----------------|------------------|--------------------|------------------|--------------------|------------------|
| | on: RGV-03, | | | | | | | |
| | levation Data | num= | 460 | _ | | _ | | _ |
| Sta
0 | Elev Sta
119.46 8.91 | Elev
119.63 | Sta
17.82 | Elev
117.29 | Sta
49.37 | Elev
118.84 | Sta
62.37 | Elev
120.77 |
| 71.28 | 124.9 77.22 | | 83.16 | 128.24 | 103.96 | 135.18 | 112.86 | 135.99 |
| 117.51 | 135.41 131.44 | | 54.65 | 123.92 | 156.97 | 123.5 | 178.14 | 122.15 |
| 189.94 | 120.35 208.45 | 118.64 2 | 215.91 | 118.69 | 237.16 | 117.84 | 253.68 | 115.21 |
| 260.77 | 112.65 270.22 | | 294.42 | 105.54 | 299 | 104.68 | 313.4 | 104.52 |
| 500.52 | 104.54 514.91 | | 579.2 | 104.7 | 601.28 | 105.22 | 615.67 | 108.25 |
| 665.18
718.78 | 108.94 683.37
113.1 723.51 | | 90.45
744.75 | 110.17
112.71 | 699.9
836.83 | 110.22
112.68 | 709.34
850.99 | 111.06
112.85 |
| 855.72 | 112.61 874.6 | | 19.46 | 112.71 | 938.34 | 113.01 | 947.79 | 112.85 |
| 973.76 | 112.92 1011.54 | 112.79 10 | | | 1054.03 | | 1063.47 | 113.19 |
| 1084.72 | 112.84 1113.05 | 113.07 11 | | | 1167.35 | | 1183.88 | 113.19 |
| 1195.69 | 113.74 1205.13 | 112.98 12 | | | 1268.88 | | 1301.92 | 113.03 |
| 1309.01
1481.35 | 113.17 1339.7
113.43 1530.93 | 112.96 14
113.4 15 | | | 1445.94
1549.82 | | 1471.91
1568.71 | 113.22 |
| 1589.96 | 111.35 1599.4 | | 611.2 | | 1664.59 | | 1734.43 | 113.13 |
| 1868.77 | 110.04 1911.75 | 109.98 19 | | | 2019.21 | | 2029.96 | 110.08 |
| 2094.44 | 110.03 2158.93 | 110.13 21 | .96.53 | 110.1 | 2223.4 | 110.21 | 2261.02 | 110.12 |
| 2271.76 | 110.28 2320.11 | | 341.6 | | 2371.42 | | 2385.59 | 110.86 |
| 2397.4 | 111.47 2416.28 | 111.42 24 | | | 2442.26 | | 2470.58 | 111.61 |
| 2503.64
2624.05 | 112.02 2517.8
113.63 2633.49 | 112.01 25
113.45 2 | 2657.1 | | 2567.38
2664.18 | 112.17 | 2591
2683.07 | 112.26
113.59 |
| 2690.15 | 112.28 2694.87 | 113.43 27 | | | 2732.65 | | 2739.73 | 112.64 |
| 2749.17 | 112.17 2784.59 | 111.73 28 | | | 2850.69 | | 2867.23 | 112.17 |
| 2921.91 | 112.38 2938.03 | | 2959.3 | | 2975.65 | | 2997.14 | 112.4 |
| 3013.26 | 112.75 3029.37 | 112.51 30 | | | 3083.11 | | 3093.86 | 112.5 |
| 3120.72 | 113.17 3142.21 | 113.29 31 | | | 3185.95 | | 3226.08 | 114.04 |
| 3255.06
3370.1 | 113.85 3271.18
113.35 3386.62 | 113.98 32
113.23 34 | | | 3325.24
3414.95 | | 3365.38
3431.48 | 112.99
114.34 |
| 3437.74 | 114.02 3450.37 | 114.03 34 | | | 3476.33 | | 3495.22 | 114.5 |
| 3509.39 | 114.22 3518.83 | 114.86 35 | | | 3535.36 | | 3542.44 | 114.18 |
| 3566.05 | 114.96 3584.94 | 114.33 35 | | | 3608.54 | | 3625.07 | 114.56 |
| 3641.6 | 115.29 3653.4 | 115.2 36 | | | 3669.93 | | 3686.46 | 111.23 |
| 3701.03
3804.5 | 110.96 3738.63
110.91 3825.75 | 111.06 37
111.29 38 | | 110.9 | 3783.25
3863.52 | | 3797.41
3872.96 | 111.18
110.94 |
| 3877.68 | 112.19 3884.77 | 116.04 38 | | | 3898.93 | | 3906.02 | 116.37 |
| 3915.46 | 114.45 3927.26 | 113.19 39 | | | 3957.96 | | 3991.01 | 111.01 |
| 4012.25 | 110.9 4034.16 | 111.27 40 | | | 4061.02 | | 4098.65 | 112.67 |
| 4104.02 | 112.54 4120.13 | 109.62 41 | | | 4179.25 | | 4217.65 | 108.03 |
| 4248.34 | 109.15 4253.06
108.42 4345.14 | 108.85 42 | | | 4286.12 | | 4309.73 | 110.07 |
| 4333.33
4421.03 | 108.83 4441.94 | 108.94 43
108.74 44 | | | 4387.63
4496.24 | | 4397.08
4512.76 | 110.04
107.71 |
| 4536.38 | 108.11 4552.9 | 107.95 45 | | | 4585.95 | 107.56 | 4607.2 | 107.43 |
| 4628.45 | 107.78 4642.61 | 108.3 46 | 54.41 | 107.86 | 4668.19 | 107.92 | 4687.47 | 107.37 |
| 4701.63 | 107.65 4708.71 | 108.68 47 | | | 4732.33 | | 4744.13 | 109.24 |
| 4753.57 | 109.12 4763.02
107.22 4829.13 | 107.92 47 | | | 4781.91 | | 4788.99 | 108.59 |
| 4807.88
4883.44 | 107.22 4829.13 | 108.92 48
109.15 49 | | | 4862.18
4933.02 | | 4873.99
4944.83 | 108.36
112.41 |
| 4956.63 | 111.81 4963.72 | | 1973.6 | | 4978.54 | | 4985.82 | 104.65 |
| 5018.01 | 99.08 5027.56 | 97.72 50 | | | 5072.73 | | 5093.62 | 95.48 |
| 5118.32 | 93.97 5130.67 | 93.79 51 | | | 5167.73 | | 5193.18 | 87.63 |
| 5204.14 | 88.8 5215.1 | 88.91 52 | | | 5243.74 | | 5258.96 | 94.5 |
| 5291.84
5346.65 | 94.42 5302.8
101.02 5349.94 | 94.26 53
101.51 53 | | 101.64 | 5324.73
5379.8 | | 5335.69
5407.29 | 98
107.76 |
| 5418.08 | 113.38 5423.12 | 114.68 54 | | | 5453.39 | | 5460.96 | 113.64 |
| 5488.71 | 113.69 5498.81 | 114.25 55 | | 114.59 | 5531.6 | 114.52 | 5549.26 | 113.76 |
| 5561.88 | 114 5569.44 | 113.76 55 | | | 5594.67 | | 5602.24 | 113.91 |
| 5607.28 | 113.49 5624.94 | 113.2 56 | | 113.33 | 5698.1 | | 5750.94 | 112.87 |
| 5766.21
5863.4 | 112.63 5807.19
111.45 5872.76 | 112.59 58
110.5 58 | | | 5835.29
5896.18 | | 5854.03
5910.24 | 113
114.9 |
| 5919.6 | 116.45 5924.29 | 116.61 59 | | | 5957.07 | | 5985.18 | 115.09 |
| 6003.91 | 115.24 6041.4 | 115.16 60 | | | 6074.18 | | 6092.91 | 115.34 |
| 6126.97 | 115.17 6172.38 | | 214.7 | | 6228.75 | 115.99 | 6284.97 | 115.43 |
| 6303.7 | 115.65 6327.12 | 115.64 63 | | | 6449.89 | | 6477.01 | 116.33 |
| 6528.54
6664.36 | 116.61 6578.56
115.5 6669.05 | 116.32 66
115.44 66 | | | 6640.94
6706.52 | 117.15 | 6650.3
6715.88 | 116.85
116.02 |
| 6758.03 | 115.92 6772.08 | 116.01 67 | | | 6800.18 | | 6809.54 | 116.88 |
| 6823.59 | 116.13 6873.74 | 115.89 69 | | | 7040.24 | | 7052.85 | 116.07 |
| 7062.94 | 116.76 7146.2 | 116.82 71 | | | 7214.32 | | 7262.25 | 116.53 |
| 7322.8 | 116.07 7335.42 | 116.19 73 | | | 7416.14 | 115.78 | 7433.8 | 115.92 |
| 7471.65 | 115.78 7514.54 | 115.39 75 | | | 7605.36 | | 7610.41 | 115.1
114.91 |
| 7625.54
7807.19 | 115.33 7653.29
114.71 7824.85 | 115.16 76
114.57 7 | 1829.9 | | 7681.05
7860.17 | | 7751.68
7867.74 | 114.66 |
| 7877.83 | 114.8 7892.96 | 115.74 79 | | 115.89 | 7908.1 | | 7913.14 | 114.82 |
| 7940.9 | 113.16 7953.51 | 113.11 79 | | 113.47 | 7973.7 | | 7986.31 | 115.49 |
| 7991.36 | 115.95 8001.45 | 117.84 80 | | | 8026.67 | | 8036.76 | 116.94 |
| 8054.43 | 115.67 8062 | 115.49 80 | | | 8102.36 | | 8130.11 | 116.74 |
| 8145.25
8231.03 | 118.03 8160.38
118.98 8256.25 | 118.48
118.8 82 | 8173 | | 8190.66
8304.19 | | 8195.71
8316.8 | 118.67
119.14 |
| 8336.99 | 119.17 8377.35 | 118.93 84 | | | 8447.99 | | 8465.65 | 119.5 |
| 8478.26 | 119.41 8506.01 | 120.35 85 | 23.68 | 119.91 | 8538.82 | 119.79 | 8553.95 | 118.92 |
| 8565.85 | 118.84 8586.75 | 118.17 86 | | | 8692.71 | | 8725.09 | 118 |
| 8734.45 | 117.86 8762.56 | 118.08 88 | | | 8897.06 | | 8973.32
9255.31 | 117.98 |
| 9058.52
9295.67 | 118.12 9081.04
118 9373.88 | 118.01 91
118.18 93 | | | 9172.05
9431.91 | | 9255.31 | 118.12
118.06 |
| 9505.08 | 118.1 9563.1 | 117.86 95 | | | 9600.95 | 118.57 | 9628.7 | 118.2 |
| 9646.35 | 117.46 9664.01 | 117.32 97 | | | 9778.88 | | 9797.62 | 117.77 |
| 9872.55 | 117.72 9881.91 | 117.81 99 | | | 10044.97 | | 10078.62 | 117.93 |
| 10102.04 | 117.810135.79 | 117.94102 | | | 10327.53 | | 10342.68 | 118.77 |
| 10355.29
10405.74 | 116.9510365.38
119.0510410.79 | 118.5103
120.94104 | | | 10380.52 | | 10429.4 | 120.46 |
| 10469.49 | 117.7610488.19 | 117.06105 | | | 10517.58 | | 10524.36 | 119.01 |
| 10537.92 | 119.1910549.23 | 121.12 10 | | | 10601.23 | | 10612.54 | 118.5 |
| Many 1 | - 17-1 | | | | | | | |
| Manning's | | num= | 4
Sta | n Val | C+- | n Val | | |
| Sta
0 | n Val Sta
.066 2683.07 | n Val
.12 50 | Sta
018.01 | | Sta
5418.08 | n vai | | |
| _ | _ | | _ | | | | | |
| | | | | | | | | |

Bank Sta: Left Right Lengths: Left Channel Right 4963.72 5418.08 1062.5 1652.05 1250

Coeff Contr. Expan.

| Sta L
1589.96 | Sta R Elev
3365.38 111.35 | | | | |
|----------------------|----------------------------------|--------------------------------|------------------|----------------|------------------|
| CROSS SEC | TION | | | | |
| | | | | | |
| RIVER: Ri | | RS: 179.63* | | | |
| INPUT | wer neder | 1.0.00 | | | |
| Descripti | on: RGV-03, | 450 | | | |
| Station E
Sta | levation Data
Elev Sta | num= 460
Elev St | | | Elev |
| 0
65.05 | 121.7 9.3
120.05 68.15 | 121.87 12.3
121.08 74.3 | | | 118.89
128.07 |
| 92.93
167.63 | 129.92 108.42
120.5 170.41 | 135.38 117.7
120.06 195. | | 135.11 139.9 | 130.55
117.81 |
| 240.83 | 118.17 260.57 | 117.98 266.2 | 1 117.59 280.32 | 115.38 285.96 | 114.1 |
| 294.42
580.86 | 110.54 305.71
101.67 598.06 | 109.32 340.
101.4 674.8 | 7 101.85 701.24 | 102.13 718.44 | 101.6
106.68 |
| 777.58
841.63 | 107.83 799.31
113.81 847.27 | 108.34 807.7
114.03 858.5 | | | 110.78
113.18 |
| 920.6
1044.72 | 113.1 982.66
113.08 1056 | 113.18 999.5
113.28 1081.3 | | | 113.24
113.46 |
| 1146.26
1253.44 | 113.54 1182.92 | 113.46 1191.3
113.34 1295.7 | 9 113.31 1228.05 | 113.73 1242.15 | 113.52
113.41 |
| 1360.63 | 113.5 1377.55 | 113.42 1397.2 | 9 113.81 1411.4 | 114.63 1422.68 | 113.5 |
| 1439.6
1546.78 | 113.78 1583.46 | 113.51 1490.3
113.46 1690.6 | 4 113.75 1710.39 | 113.59 1741.41 | 113.56
113.72 |
| 1752.69
1882.44 | 110.85 1893.72 | 113.96 1823.2
110.25 1902.1 | 9 108.93 1907.83 | 108.58 2055.05 | 113.54
108.58 |
| 2215.55
2780.46 | | 108.65 2485.1
108.99 2833.0 | | | 108.74
110.33 |
| 2880.97
2990.97 | 110.78 2900.71
111.33 3033.29 | 110.95 2934.5
111.96 3050.2 | 6 110.65 2948.67 | 110.73 2974.05 | 111.31
111.85 |
| 3106.62
3165.86 | 113.41 3117.9 | 113.83 3129.1
113.82 3196.8 | 8 113.53 3140.47 | 113.92 3157.4 | 114.07
113.4 |
| 3247.65 | 112.26 3256.12 | 112.37 3267. | 4 111.67 3309.71 | 111.03 3343.56 | 111.1 |
| 3388.69
3501.52 | 110.85 3408.44
111.88 3518.44 | 111.35 3416.
111.48 3566.3 | 9 111.48 3572.03 | 111.7 3602.16 | 111.41
111.53 |
| 3627.83
3780.76 | 112.09 3666.37
112.41 3808.97 | 111.96 3679.
112.2 3837.1 | 7 112.49 3891.05 | 112.55 3916.15 | 112.03
112.2 |
| 3938.72
4045.9 | | 111.82 4003.5
112.92 4074. | | | 112.52
113.73 |
| 4116.41
4198.21 | 114.54 4136.16
114.81 4206.67 | 113.95 4158.7
115.3 4215.1 | | | 115.19
115.09 |
| 4265.91
4347.71 | 114.23 4280.01 | 111.48 4294.1
114.99 4367.4 | 1 111.92 4313.86 | 114.34 4333.6 | 115
108.96 |
| 4404.61 | 108.81 4449.54 | 108.74 4466.1 | 8 108.61 4502.84 | 108.62 4519.76 | 109.22 |
| 4528.22
4610.02 | 108.88 4615.66 | 109.38 4570.5
110.71 4624.1 | 3 116.46 4626.95 | 117.54 4632.59 | 108.68
118 |
| 4641.05
4691.82 | 116.53 4649.51
110.47 4711.57 | 116.92 4655.1
109.72 4731.3 | 1 109.76 4751.05 | 109.2 4765.15 | 112.14
109.37 |
| 4776.44
4886.07 | 109.08 4799.01
110.4 4905.33 | 109.13 4821.8
109.13 4924.5 | | | 109.75
108.77 |
| 5058.5
5131.84 | 110.38 5064.14
111.93 5140.3 | 109.96 5083.8
111.3 5160.0 | | | 111.5
109.17 |
| 5196.71
5303.89 | | 109.42 5236.
107.74 5354.6 | 2 110.23 5264.41 | 108.69 5289.79 | 108.38
107.07 |
| 5402.62 | 107.64 5422.36 | 107.37 5433.6 | 5 107.48 5447.75 | 108.13 5461.85 | 106.96 |
| 5487.24
5583.14 | 106.84 5512.62
107.76 5600.06 | 107.24 5529.5
108.37 5608.5 | 2 109.93 5625.44 | 110.67 5636.73 | 108.11 |
| 5650.84
5704.43 | 110.62 5662.12
109.93 5712.89 | 110.4 5673.
109.36 572 | 7 107.78 5738.28 | 108.54 5746.74 | 108.75
109.77 |
| 5752.38
5817.27 | 110.06 5760.85
110.4 5828.55 | 109.47 5774.9
109.77 5848. | | | 108.85
111.99 |
| 5876.51
5927.52 | 112.91 5890.61
110.32 5936.13 | 113.3 5904.7
106.11 5938.9 | | | 111.99
99.08 |
| 5987.74
6079.76 | 97.99 6003.69
95.51 6093.75 | 97.13 6022.9
94.52 6108.1 | 1 96.8 6050.03 | 96 6064.89 | 95.98
91.66 |
| 6181.18
6307.06 | 87.21 6214.76
96.91 6329.94 | 89.76 6233.9
98.51 6344.8 | 6 96.17 6249.84 | 96.51 6295.61 | 96.54
104.99 |
| 6404.68 | 108.86 6415.94 | 112.63 6420.2 | 3 113.27 6433.1 | 112.73 6475.98 | 112.62 |
| 6499.62
6635.09 | 113.32 6527.44
112.52 6653.94 | 112.66 6561.7
112.15 6698.8 | 5 111.93 6726.73 | 111.35 6746.65 | 112.32
111.43 |
| 6758.6
6814.33 | 113.32 6770.54
108.33 6822.29 | 113.38 6786.4
109.97 6834.2 | 4 115.06 6842.19 | 117.36 6846.18 | 108.36
117.57 |
| 6862.1
6957.64 | 116.48 6874.04
115.86 6973.56 | 116.32 6897.9
115.65 6989.4 | | | 115.58
115.83 |
| 7093
7220.38 | 116.27 7104.94
117.39 7267.16 | 117.08 7152.7
117.35 7303.9 | | | 116.68
118.21 |
| 7403.51
7479.14 | 117.88 7431.38
116.63 7495.07 | 118.09 7455.2
119.05 7510.9 | 6 119.15 7463.21 | 118.71 7475.16 | 116.71
117.47 |
| 7566.71 | 117.61 7582.63 | 118.82 7590. | 6 117.33 7598.55 | 118.93 7610.49 | 117.81 |
| 7638.36
7813.92 | 117.51 7670.21
117.89 7983.31 | 117.41 7702.0
117.67 8034.7 | 7 117.37 8045.49 | 117.42 8114.1 | 117.52 |
| 8161.28
8367.12 | 117.19 8197.72
116.74 8403.56 | 116.91 8210.5
116.49 8430.4 | 8 116.57 8461.46 | 116.4 8465.75 | 116.71
116.23 |
| 8491.48
8579.39 | 116.54 8506.48
115.81 8587.96 | 116.49 8527.9
116.62 8602.9 | | | 115.69
118.2 |
| 8641.57
8733.76 | 117.47 8663.01
118.03 8808.62 | 116.75 8678.0
118.52 8828.1 | 2 117.13 8697.32 | 117.02 8720.9 | 117.38
118.46 |
| 8991.07
9091.23 | 118.51 9016.8
118.71 9109 | 118.72 9040.3
118.32 9145.4 | 8 119.38 9063.37 | 119.43 9079.3 | 118.69
118.16 |
| 9234.53 | 117.97 9258.42 | 118.25 9282.
117.99 9488.5 | 3 118.12 9330.06 | 118.17 9347 | 118.05 |
| 9372.73
9580.84 | 118.13 9437.54
117.95 9616.66 | 118.05 9711.5 | 1 117.9 9771.91 | 118 9889.48 | 118.08 |
| 9907.24
10034.61 | 117.67 9938.8
117.310062.47 | 117.66 9970.9
117.4910122.1 | 9 117.4310138.11 | 117.59 10201.8 | 117.41
117.45 |
| 10209.75
10396.85 | 117.5810249.57
117.3810416.74 | 117.4310269.4
117.51 10508. | | | 117.57
117.85 |
| 10612.08
10671.84 | 116.9510633.52
120.7310680.15 | 118.3810648.5
118.7210691.2 | 3 118.9610654.96 | 118.7410663.54 | 120.79
115.94 |
| 10788.16
10843.54 | 116.4410796.46
120.6810857.38 | 117.4810813.0
120.1810871.2 | 7 117.7110821.38 | 119.9410826.92 | 120.85 |
| 20010.04 | _20.0010037.30 | _20.10100/1.2 | | 117.0010904.40 | ±±1.00 |

```
Manning's n Values num= 4
Sta n Val Sta n Val Sta
0 .066 2974.05 .12 5976.59
                                                                          n Val
                                                                             .025 6415.94
Bank Sta: Left Right 5913.19 6415.94 1062.5 1652.05
Ineffective Flow num= 2
Sta L Sta R Elev Permanent 0 5913.19 112.35 T
6415.9410904.46 112.63 T
Left Levee Station= 117.71 Elevation=
                                                                                                          Coeff Contr. Expan.
                                                                                       Right
Left Levee Station= 117.71
Right Levee Station=10670.91
                                                                   Elevation=135.8925
                                                               _....135.8925
Elevation=120.8075
Sta L Sta R Elev
1857.06 3106.62 113.54
CROSS SECTION
RIVER: Rio Grande
 REACH: Lower Reach
                                              RS: 179.4
Description: RGV-03, Bathymetric elevations translated from IBWC 2008 Cross-sections
Cross-sections
Station Elevation Data num=
Sta Elev Sta Ele
0 123.95 9.68 124.5
54.83 118.95 67.73 119.0
90.31 127.89 96.76 129.7
                                                              459
                                             Elev
124.12
                                                               Sta
12.9
                                                                              Elev
                                                                         123.25 19.35 119.26
120.4 77.41 124.85
135.57 122.56 135.8
                                                                         123.25
                                                                                                                       22.58
                                                                                                                                  118.97
                                             119.33
129.75
                                                           70.96
112.89
                                                                                                                       83.86
                                                                                                                                     127 1
                                                                                                         135.8 129.02
                 129.02 180.62
117.09 265.75
                                              117.08
117.66
                                                           183.85
288.71
                                                                          116.62 213.26
117.8 295.27
                                                                                                      117.39
117.34
    148.37
                                                                                                                     229.66
                                              108.44
98.71
99.03
                                                             341.2
661.2
821.2
    318.23
                      113
                                328.07
                                                                          107.32
                                                                                          381.2
                                                                                                        98.64
                                                                                                                       401.2
                                 621.2
801.2
                                                                            98.8
                                                                                       681.2
915.26
     581.2
781.2
                   98.84
                                                                                                                       701.2
                    99.06
                                                                                                                       925.1
                  108.84 951.35
114.41 1000.55
                                              110.49 964.47
113.66 1016.95
                                                                          114.52
113.52
                                                                                        971.03
    938 23
                                                                                                       114.81
                                                                                                                    984.15
                                                                                       1056.32
  1079.28
                  113.62 1128.49
                                              113.67 1148.17
                                                                           114.04 1154.73
                                                                                                       113.55 1180.97
                                              113.79
                                                            1243.3
                                                                           113.75 1262.98
                                              114.16 1331.87
114.07 1443.4
114.33 1518.85
                                                                          113.75 1202.96
113.99 1361.39
114.5 1463.09
113.95 1568.06
                  114.06 1318.75
114.36 1430.28
113.87 1512.29
  1282.67
                                                                                                       114.03 1371.24
                                                                                                      114.28 1472.93
114.02 1587.74
  1492.61
                                              114.44 1627.11
114.17 1728.8
114.06 1879.69
                  114.32 1610.7
114.03 1718.96
                                                                          115.53 1640.23
113.92 1774.72
                                                                                                      114.02 1659.91
114.1 1784.56
    1594.3
  1682.87
                                                                                                      114.11 1951.86
114.67 2063.4
  1827.21
                  113.96 1866.57
                                                                            114 4 1886 25
                                                                                                                                   114.32
                  114.08 2010.91
                                              114.21 2024.03
                                                                           114.59 2050.27
                                                                                                      113.95 2168.37
107.32 3260.75
109.84 3346.05
                                              114.29 2119.16
109.55 2197.89
109.23 3323.08
                                                                          115.38 2145.41
107.79 2204.45
109.24 3336.21
  2092.92
                  114.52 2106.04
                                                                                                                                   111.36
                 114.52 2106.04
110.36 2188.05
107.88 3296.84
110.07 3362.45
110.61 3464.14
  3280.44
                                              109.69 3375.57
110.65 3490.39
                                                                          110.04 3398.53
111.17 3503.51
                                                                                                      109.68 3414.94
111.08 3513.35
                                                                                                                                     109.8
  3359.17
   3444.46
                  111.16 3546.15
113.61 3638.01
                                              111.54 3565.84
114.14 3657.69
                                                                          111.43 3598.64
114.37 3667.53
113.48 3762.66
  3533 03
                                                                                                       113.48 3611.76
                                                                                                      113.43 3693.77
111.96 3772.5
                  111.43 3710.17
                                              113.46 3729.86
  3703.61
                                                                                                                                     112.1
                                                                                                      110.33 3874.2
110.75 4021.82
                  111.16 3808.59
                                              110.68 3828.27
                                                                           110.66 3834.83
                                              110.53 3959.49
  3926.68
                  109.96 3949.65
                                                                           110.33 3998.85
                                                                                                                                   110.49
                                                                          110.58 4133.35
110.66 4353.13
110.77 4438.42
111.43 4586.04
                  110.84 4077.58
110.51 4221.92
110.82 4402.34
                                              110.44 4087.42
110.81 4277.69
                                                                                                      110.53 4139.91
110.82 4382.66
                                                                                                                                   110.76
  4166.15
                                              111.1 4415.46
111.03 4566.36
                                                                                                      110.66 4448.26
110.94 4641.81
    4392.5
                                                                                                                                   110 94
                  111.11 4540.11
                                                                          112.69 4710.69
114.49 4795.98
114.98 4877.99
                  112.16 4671.33
  4648.37
                                               111.8 4691.01
                                                                                                       112.22 4723.81
                  113.48 4759.9
114.23 4855.03
                                              113.43 4773.02
115.52 4868.15
                                                                                                      113.69 4822.23
115.62 4887.83
  4841.91
                  114.88 4917.36
110.46 4969.84
                                              114.83 4920.64
110.33 4979.68
                                                                          115.41 4930.48
111.04 5002.65
                                                                                                      115.28 4946.88
114.12 5015.77
  4907.52
  4963.28
  5025.61
                                              113.94 5051.85
106.66 5179.79
107.48 5294.6
                                                                          114.46 5064.97
106.33 5222.43
                  114.71 5042.01
                                                                                                       112.51 5081.37
                  106.68
                                5110.9
                                                                                                       106.39 5242.11
                  106.72 5281.48
                                              107.48 5294.6
106.82 5353.64
116.95 5393.01
  5251.95
                                                                           108.64 5301.16
                                                                                                       108.78 5317.56
                  106.61 5347.08
118.92 5383.17
                                                                          109.23 5363.49
117.46 5399.57
                                                                                                       116.21 5406.13
  5373.33
                 118.92 5383.17
111.08 5442.21
107.69 5540.62
108.58 5730.89
111.07 5898.18
                                              108.89 5465.18
107.27 5566.87
                                                                          107.97 5488.14
107.07 5612.79
  5422.53
                                                                                                       108.15
                                                                                                                     5511.1
                                                                                                                                   107.39
                                                                                                      107.32 5639.04
109.51 5868.66
113.1 5953.95
    5527.5
                                              108.79 5766.97
111.23 5921.15
                                                                          108.79 5826.02
113.26 5927.71
    5678.4
  5963 79
                  113.01 5986.75
                                              109 88 6003 16
                                                                          109 84 6009 72
                                                                                                      109 46
                                                                                                                     6029 4
                                                                                                      109.4 6108.13
107.18 6213.1
106.78 6304.95
106.7 6416.48
                  109.34 6062.2
108.51 6137.65
                                              109.37 6075.32
108.02 6154.05
                                                                          110.42 6088.45
107.09 6183.58
  6121.25
                  106.35 6249.18
107.87 6337.75
                                              106.42 6268.87
106.36 6367.28
                                                                          107.16 6291.83
106.25 6396.8
  6236.06
  6321.35
                                                                                                      106.7 6416.48
109.09 6508.33
111.68 6583.78
110.5 6646.12
110.4 6701.89
110.4 6787.19
114.19 6852.8
105.77 6892.17
                                                                          108.15 6498.49
112 6570.66
111.26 6629.71
111.21 6685.49
111.31 6764.22
113.93 6836.4
                                              108.58 6478.81
113.41 6557.54
109.7 6619.87
110.86 6675.64
                  107.16 6475.53
112.13 6541.14
109.07 6610.03
  6432.88
  6528.01
  6596 91
                  109.28 6669.08
110.07 6737.98
                                              109.33 6751.1
112.91 6820
112.06 6879.05
  6721.57
                  112.61 6810.15
112.51 6869.21
                                                                          113.93 6836.4
110.1 6888.89
  6862.65
  6919.17
7036.17
                  101.03 6935.17
96.48 7053.17
                                               99.08 6966.17
96.18 7069.17
                                                                            97.08 7002.17
95.08 7085.67
                                                                                                        96.68 7019.17
95.38 7117.17
                                              86.78 7186.17
98.64 7332.17
111.53 7482.71
                                                                          87.98 7204.17
99.06 7352.17
112.05 7495.83
                   91.98 7169.17
98.35 7252.17
                                                                                                        89.98 7220.17
99.03 7372.17
  7135 17
                                                                                                                                     96 98
                                                                                                      111.56 7541.76
111.26 7633.62
112.83 7705.78
                  111.88 7466.3
111.24 7581.13
110.99 7669.71
  7413.81
                                              111.41 7594.25
110.14 7686.11
                                                                          111.72 7604.1
110.28 7695.95
   7646.75
                                                                          106.23 7741.84
118.53 7781.17
115.99 7859.84
  7718.89
7758.23
                  111.23 7725.45
115.23 7764.78
                                              108.09 7732
118.26 7768.06
                                                                                                      106.24 7748.39
117.1 7791
                                                                                                        116.4 7872.95
                                              116.06 7850.01
116.27 7918.84
117.59 8049.96
                  115.66 7823.78
  7810.67
                                                                                                                                   116.16
                              7895.9
                                                                           116.37 7971.29
                                                                                                      117.05 7981.12
118.67 8125.35
                  116.52
  8020.46
                  117.07 8033.57
                                                                           117.73 8076.18
                  117.07 8033.57
118.84 8154.85
119.73 8269.57
121.06 8315.46
120.83 8381.01
                                                                                                      118.67 8125.35
119.49 8226.96
117.92 8289.24
119.02 8361.34
119.48 8420.34
                                              119.23 8190.91
121.15 8276.12
                                                                          119.82 8207.3
120.57 8285.96
  8249.91
  8302.35
8374.45
                                              120.05 8322.01
118.84 8387.56
                                                                          119.11 8351.51
120.98 8397.39
                                              119.06 8521.94
118.8 8780.86
                                                                          118.97 8535.05
118.57 8843.13
  8446.56
                  118.93 8472.78
                                                                                                       118.78 8567.82
                                                                                                      118.67 8872.63
118.27 9072.56
                                              118.38 9016.84
118.23 9236.43
117.98 9449.47
  8964.4
9115.17
                  118 54 8990 62
                                                                          118.46 9049.62
                                                                          118 9331.48
118.12 9498.63
  9383.92
                  118.08 9419.97
                                                                                                       117.93 9544.52
                  118.04 9593.68
118.33 9734.61
                                              118.83 9606.79
118.08 9754.28
                                                                         118.38 9616.62
118.42 9773.94
                                                                                                       118.57 9692.01
  9728.06
                                                                                                      118.21 9813.27
                                                                                                                                     118.3
                                            9826.38
                  118.13 9859.16
```

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10275.4 117.6210288.51 117.4210350.79
                                  117.4 10495
117.2310612.99
 10465.5
              117.210478.61
117.110586.77
                                              10495
                                                        117.2210531.05 117.17 10537.6
117.0810675.26 117.210691.65
                                                                                                   117.35
                                                                             116.7210911.24
10708.03
             117.1110783.42
                                  116.8510868.63
                                                        116.9410894.85
                                                       116.15 10960.4
114.6111068.56
10921.07
             119.74 10930.9
                                  117.1610944.01
                                                                              116.4310999.73
11016.12
             114.8211039.06
                                  114.5111058.73
                                                                             115.9611088.22
                                  120.5711124.28
                                                        120.8311140.66
                                                                               120.411147.22
11157.05 118.8511179.99 116.1911189.83 117.2511196.38 117.27
      Sta n Val Sta n Val Sta 0 .066 3693.77 .12 6919.17
                                                       n Val Sta
.025 7372.17
                                  Lengths: Left Channel Right
1754.79 1830.6 1749.92
                     Right
                                                                                Coeff Contr. Expan.
Bank Sta: Left
        6862.65 7413.81
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 6862.65 112.51
7413.8111196.38 111.88
Left Levee Station= 122.56
Right Levee Station=10921.07
                                                                    135.8
                                                  Elevation=
                                                  Elevation= 119.74
Right Levee Scatton 10111.

Blocked Obstructions num=
Sta L Sta R Elev
 Sta L Sta R Elev
2145.41 3611.76 114.03
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                   Channel
  E.G. Elev (ft)
                                    132 49
                                                                                     Left OB
                                                                                                                  Right OB
  Vel Head (ft)
                                                   Wt. n-Val.
                                                                                       0.085
                                                                                                     0.043
                                       0.04
                                    132.45
                                                  Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                  1749.92
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                    1754 79
                                                                                                   1830 60
                                                                                   127804.50
                                                                                                   18998.19
                                                                                                                  56803.94
  Crit W.S. (ft) 117.33

E.G. Slope (ft/ft) 0.000059

Q Total (cfs) 235000.00

Top Width (ft) 11059.48

Vel Total (ft/s) 1.15

Max Chl Dpth (ft) 45.67
                                                  Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                  143093.70
                                                                                                   18998.19
                                                                                                                  57106.20
                                  11059.48
                                                                                    6725.75
                                                                                                     551.16
                                                                                                                  3782.57
                                                                                     0.96
                                                                                                       2.80
                                                                                                     34.47
                                                                                                                    15.02
  Conv. Total (cfs)
Length Wtd. (ft)
                                                  Conv. (cfs)
Wetted Per. (ft)
                                  30548250.0
                                                                                     15883620.0
                                                                                                       6912519.0
                                                                                                                       7752109 0
                                   1768.43
                                                                                    6743.34 557.35
                                                                                                     0.13
                                                  Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
                                      86.78
                                                                                        0.07
                                                                                                                      0.06
  Alpha
                                                                                  282706.90
  Frctn Loss (ft)
C & E Loss (ft)
                                                  Cum Volume (acre-ft)
                                                                                                                 277996.80
                                                                                                   86340.48
                                        0.10
                                                Cum SA (acres)
                                                                                                   3349.27
Warning: The cross-section end points had to be extended vertically for the computed water surface.
           Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
```

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 179 10*

INPUT

Description: RGV-03, Station Elevation Data num= 460 Sta 0 Elev Sta 6.45 Elev Sta 12.9 Elev 126.73 36.55 81.71 146.36 126.85 123.61 123.4 127.33 127.07 64.51 123.28 130.6 121.73 117.18 75.26 138.14 51 61 134.48 134.63 88.52 133 26 117.97 108.94 116.76 194.69 116.4 225.85 230.21 256.99 117.59 263.91 298.51 417.33 312.36 441.09 115.62 288.13 114.61 378.72 105.08 408.42 104.9 105.12 470.79 104.82 595.54 705.43 818.74 928.35 521.29 104.92 105.05 568.81 687.61 105.12 104.76 104.45 625.24 732.17 497.52 105.11 104.82 634.15 102.59 108.25 761.86 880.68 102.45 109.19 797.64 917.97 102.51 106.58 833.15 110.18 942.2 747.02 850.97 113.36 1023.24 956.04 111.35 969.88 113.93 997.57 113.89 1007.95 1049.97 113.6 1130.16 113.26 1251.95 113.62 1163.68 113.16 1284.8 113.93 1170.6 113.39 1357.47 113.58 1183.63 113.66 1388.62 1219.05 113.92 1443.99 114.33 1547.81 114.4 1461.29 114.69 1554.73 1412.33 114.27 1475.13 114.59 1495.91 114.4 1605.39 115.43 1682.78 114.89 1866.76 114.34 1627.41 114.48 1506.29 114.81 1651.63 114.43 1798.45 114.82 1668.94 114.31 1840.04 114.22 1703.54 114.71 1905.38 1634.33 1750.93 1935 4 115.1 1942.32 114.89 1976.66 114.89 1988.54 114 39 1994 48 113 29 115.1 1942.32 112.49 2042 115.01 2148.92 110.14 2260.71 108.2 2442.97 112.44 2062.8 115.19 2174.19 113.78 2071.7 114.82 2188.03 115.03 2215.72 2129.21 2246.86 109.52 2278.01 107.83 2505.34 107.95 2315.25 107.76 2543.95 108.01 2368.71 108.04 2567.71 2419.2 109.15 2621.17 108.34 2864.72 108.77 2633.05 108.28 2894.42 108.97 2683.54 108.53 2953.83 2588.51 108.03 2799.38 108.22 2998.37 2843.93 108.28 3069.66 108.77 3357.76 109.93 3471.96 108.37 3129.06 108.91 3372.61 110.53 3499.65 108.66 3209.25 108.69 3413.13 108.71 3253.81 109.11 3430.43 3019 17 110.38 3513.49 3440.93 110.68 3555.02 111.24 3606.92 113.69 3762.66 111.22 3648.46 114.28 3776.5 111.58 3675.56 113.65 3790.35 112.16 3714.21 114.31 3811.11 3743.87 3830.01 114.25 3849.17 114.77 3901.29 114.71 3859.55 113.68 3921.85 112.7 3866.47 113.96 3874.56 112.62 3933.97 113.2 3963.66 3892.38 113.2 3963.66 112.16 4091.38 112.18 4254.08 112.67 4343.85 112.2 4429.97 112.96 4548.78 111.88 3991.06 112.51 4119.12 112.37 4284.44 111.86 4037.92 111.95 4201.28 112.08 4328.99 112.2 4020.1 112.57 4141.88 3972 58 4269.59 112.07 4317.11 112.31 4373.54 111.98 4504.23 112.22 4400.28 112.62 4519.08 112.46 4409.19 112.58 4539.87 4355.73 4453.74 112.5 4563.64 4712.14 112.51 4578.48 112.73 4765.6 113.28 4610.52 112.95 4786.39 112.42 4634.75 111.01 4804.21 112.26 4670.56 110.42 4830.95 111.07 4880.46 112.36 4987.73 113.85 5088.09 110.91 4901.22 113.06 5011.96 113.49 5098.47 110.61 4856.23 111.69 4921.98 112.52 5039.65 4849.31 111.57 112.43 4973.89 4946.21 5060.41 113.01 5074.25 114.05 5108.85 114.28 5148.75 114.8 5171.15 114.54 5246.77 114.36 5188.45 114.01 5254.21 111.61 5205.75 111.97 114.45 5271.51 114.06 112.61 5229.98 114.17 5295.73 109.45 5356.66 5214.09 5281.89 5329.93 112.82 5306.17 108.99 5389.33 111.4 5312.11 109.11 5398.24 109.96 5319.96 108.88 5424.97 109.37 5461.84 111.14 5562.2 109.21 5482.6 110.9 5579.5 109.84 5492.98 109.85 5593.34 5442.79 109.65 5524.14 110.3 116.7 5614.11 117.67 5621.03 114.85 5672.94 109.86 5783.68 5610 65 118 07 5631 41 116.77 5641.79 116.44 5655.64 110.88 5775.44 110.06 5805.15 5730.9 109.81 5831.88 110.38 5855.64 110.23 5864.55 110.58 5950.69 110.83 5876.43 111.01 5962.57 110.42 5900.2 111.48 5995.24 110.25 5909.11 5920.98 111.8 6010.09 111.72 111.04 6069.49 111.91 6087.31 112.96 6174.73 113.19 6198.96 112.76 6143.58 6019 112.52 6128.89

112.72 5537.47

111.37 5624.97 112.08 5718.71

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112.11 6313.16
111.9 6411.05
110.86 6517.98
                   114.14 6268.16 112.36
                                                 111.62 6405.11
                                                                                                              111.46 6427.36
110.51 6531.18
  6361.6
6444.66
                   112.91 6396.21
                                                                                                                                            111.4
109.37
                                                                                109.55 6621.15
109.79 6738.81
  6545.02
                    109.2 6565.79
                                                 109.85 6583.33
                                                                                                              110.51 6638.45
                                                                                                                                             109.16
                                                   109.3 6721.51
110.9 6818.41
  6669.46
                   109.35 6700.75
                                                                                                              109.66 6758.56
  6787.27
                   110.18 6808.03
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                                                                                                                                             113.75
                  112.83 6884.16
112.21 6946.46
111.79 7060.68
111.98 7136.81
                                                 112.63 6898
111.71 6963.77
                                                                                111.03 6911.86
110.28 6977.61
                                                                                                              110.76 6925.7
110.92 6994.91
  6936.08
                                                                               111.79 7100.13
112.95 7156.56
111.32 7212.98
98.7 7316.12
92.43 7407.96
                                                 110.74 7074.52
112.09 7147.65
113.62 7205.18
  7005.3
7122.97
                                                                                                              110.79 7112.59
114.42 7164.51
  7181.81
                   113.63 7192.2
                                                                                                              107.76 7215.57
                                                                                                              95.66 7343.04
91.26 7434.88
97.48 7549.54
100.72 7642.72
                   102.91 7249.62
93.88 7368.77
                                                 100.98 7274.16
93.9 7393.71
   7355.71
                   93.88 7368.77
90.43 7491.19
98.11 7578.2
108.41 7685.36
111.78 7795.26
                                                                                97.08 7539.98
100.54 7622.25
  7470.71
7559.09
                                                   96.18 7520.87
98.81 7597.31
                                                                               111.44 7723.25
110.79 7833.16
109.56 7940.47
106.91 7992.69
114.05 8038.74
  7672.82
7772.52
                                                 112.23 7700.51
110.66 7805.23
                                                                                                              110.63 7764.94
109.92 7854.41
                                                 110.21 7925.11
110.27 7983.47
115.03 8029.53
                                                                                                              109.65 7949.69
106.9 7998.82
113.93 8057.17
                   110.71 7903.6
111.42 7971.19
  7874.85
  7958.9
8008.04
                   112.86 8017.25
  8069.46
8231.12
                   113.38 8094.03
114.76 8246.27
                                                 113.36 8178.05
115.45 8253.72
                                                                               113.73 8207.66
115.32 8305.93
                                                                                                              114.17 8216.87
116.37 8352
                                                                                                                                            116.48
                                                                                                              118.34 8493.25
117.1 8585.38
  8413.42
8505.54
                   117.38 8447.19
116.08 8517.83
                                                 117.12 8468.7
118.22 8536.25
                                                                                117.36 8487.12
116.96 8573.09
                                                                                                                                            117.94
 8501.54 116.08 8517.83
8591.52 116.85 8597.66
8735.84 116.91 8766.54
9024.48 117.25 9087.66
9334.62 117.26 9392.96
9592.56 117.15 9681.61
9853.57 117.27 9896.55
10023.8 117.0710046.53
                                                                                                             117.1 8585.38
117.02 8677.5
117.17 8966.14
117.36 9279.35
117.06 9564.92
117.36 9819.79
                                                 118.28 8606.87
117.15 8800.33
117.17 9187.23
                                                                               117.28 8652.94
117.08 8895.52
117.55 9217.94
                                                                                                                                             117.11
                                                                               117.16 9500.44
117.16 9500.44
117.65 9739.95
117.16 9948
117.4210088.23
116.7710228.46
                                                117.17 9167.23
117.11 9466.65
117.03 9727.67
117.12 9933.4
116.5410065.48
                                                                                                              116.9910001.05
118.8510095.81
                                                 116.7110179.18
116.76 10437
116.510642.73
                  117.2 10133.7
116.7210366.37
                                                                                                              116.69 10289.1
116.38 10498.4
10118.54
                                                                                                              116.410796.96
117.310946.73
116.6611009.54
10544.47
                   116.3610556.75
                                                                                116.3410728.74
                                                                                                                                            116.34
                  116.4310880.34
119.2910971.29
                                                116.2610910.65
119.3310978.94
                                                                               116.98 10933.4
117.4910989.14
10962.08
                                                                                                              115.4811101.31 115.59
115.4711185.44 116.18
11032 48
                     116 111045 23
                                                 114 8811078 37
                                                                                114 6111086 02
                                               118.59 11142.1
                                                                               118.2911172.69
11114.06 118.4411129.36
Manning's n Values num= 4
Sta n Val Sta n Val Sta
0 .066 3430.43 .12 7249.62
                                                                               n Val Sta
.025 7597.31
Bank Sta: Left Right Lengths: Left Channel Right
7192.2 7685.36 1754.79 1830.6 1749.92
Left Levee Station=81.70667 Elevation=134.6333
Right Levee Station=10971.29 Elevation= 119.33
Blocked Obstructions num= 1
                                                                                                                  Coeff Contr. Expan.
Blocked Obstructions num=
Sta L Sta R Elev
   Sta L Sta R Elev
2246.8 3471.96 110.53
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                 RS: 178.80*
INPUT
Description: RGV-03,
                                                 num=
Station Elevation Data
                                                                  460
                                                                 Sta Elev
22.58 127.98
72.11 124.24
        Sta Elev
0 129.52
                                                 Elev
127.95
                                   Sta
                                                                                                  25.8 129.82
84.6 119.48
197.1 117.48
                                      6.45
                                                                                                                             37.63
100.22
                                                                                                                                           133.39
   40.85 133.47 56.48
108.88 116.91 141.52
                                                129.26
117.02
                                                               168.97
                                                                                                 197.1
                                                                                                                             225.26
                                 268.95
393.96
                                                 114.4
111.46
                                                                               114.01 327.92
110.85 437.71
                                                                                                              111.05
111.12
                                                                                                                             353.34
   258.03
                   116.22
                                                                283.52
    384.58
                   111.01
                                                                 418.96
                                                                                                                             450.21
                                  503.33
581.46
                                                 111.01
110.16
                                                                518.95
612.7
                                                                                111.46
111.27
                                                                                               528.33
622.08
                                                                                                              111.08
110.88
                                                                                                                             553.33
640.83
    478.33
                    111 4
                   110.51
   659.58
                   111.64
105.91
                                  678.32
                                                 110.93
                                                                697.07
                                                                                112.27
                                                                                                 725.2
                                                                                                              110.19
                                                                                                                             740.83
                                  794.08
881.44
                                                 106
111.89
                                                                                               831.44
946.17
                                                                 816.28
                                                                                108.06
                                                                                                               108.2
   850.19
                   110.69
                                                                920.68
                                                                                111.03
                                                                                                                111.6
                                                                                                                             960.74
                                                 113.59 1015.34
113.65 1143.93
                                                                                113.06 1031.44
113.57 1159.55
      975.3
                   113.34
                                  993.93
                                                                                                              113.03 1059.55
  1077.24
                    113.2 1103.31
                                                                                                              113.82 1186.47
                                                                                                                                             113.61
                  113.81 1209.55
113.34 1431.42
                                                 113.37 1272.05
114.03 1440.79
                                                                                112.56
113.86
                                                                                             1313.9
1474.1
                                                                                                              112.92 1328.47
114.43 1528.72
  1200.18
   1383.08
                                                                                                              115.38 1697.03
114.42 1822.03
115.34 1937.65
115.56 2047.02
110.79 2112.64
  1572 04
                   115 09 1603 28
                                                 114.71 1643.91
                                                                                114.66 1678.28
                                                                                                                                             115 22
                   115.59 1725.33
114.62 1862.65
                                                 114.42 1797.03
115.18 1890.78
                                                                                114.75 1809.53
115.43 1918.9
  1847.02
                                                                                                                                             115.64
                                                                                115.43 1910.9
115.67 2034.52
110.7 2103.27
  1959.52
2053.27
                   115.45 1984.53
112.3 2062.64
                                                 115.93 1998.39
111.21 2075.14
                                                                                                             115.3 2150.14
115.39 2272
108.7 2406.38
108.2 2631.36
                  113.81 2125.14
115.59 2206.38
109.91 2344.28
                                                 113.4 2134.51
115.56 2215.76
                                                                               115.61 2140.76
115.88 2247.01
  2122.02
                                                                                                                                            116.08
  2181.39
                                                 108.8 2362.62
109.07 2525.12
110.99 2712.61
                                                                                108.47 2390.75
108.34 2590.74
110.21 2725.11
   2318.8
                                                                                                                                            109 17
 2447
2656.36
                   109.91 2544.20
109.9 2500.12
109.47 2678.24
                                                                                                             110.62 2734.48
108.73 2881.35
109.75 3062.59
  2743.86
2900.09
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108.79 2946.97
                                                 108.74 2803.23
109.35 2968.84
                                                                               108.86 2837.6
109.23 3000.09
  3109.46
                   109.5 3131.33
110.71 3396.94
                                                 109.23 3184.45
110.41 3418.82
                                                                               109.42 3246.95
110.57 3468.81
                                                                                                              110 3331.32
110.23 3487.57
                                                 110.52 3546.94
111.31 3695.1
113.08 3853.17
                                                                                110.35 3564.02 110.87 3607.72
111.41 3734.43 111.91 3756.3
112.73 3893.79 114.19 3903.17
                   110.06 3531.31
111.02 3651.4
                                                                                                                                            111.23
111.78
  3503.19
                   112.41 3821.92
  3815.67
                                                                                                                                             113.97
   3912.54
                   114.56 3931.3
115.42 4015.5
                                                 113.59 3937.55
113.98 4031.28
                                                                                114.26 3964.53 115.2 3984.41
115.59 4048.53116.2337 4065.66
  4003.17
                                                                                                                                             113.91
                                                113.98 4031.28
114.43 4103.16
113.96 4259.4
113.45 4325.02
113.66 4446.9
114.67 4525.02
  4087.54
4184.4
                   113.14 4093.79
113.37 4203.15
                                                                                114.41 4134.41 113.09 4162.54
113.25 4268.77 113.56 4278.15
                                                                                                                                             113.92
                                                                                                              113.49 4375.02
113.59 4490.64
114.07 4556.26
                   114.26 4312.53
113.22 4440.65
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114.17 4462.52
  4303.15
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  4409.39
  4496.89
                   113.48 4509.39
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                                                                                                             114.07 4556.26
113.28 4693.75
114 4771.88
115.33 4912.49
109.77 5037.49
                   114.15 4593.76
114.38 4731.26
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115.1 4740.63
                                                                                113.96 4640.63
114.15 4756.26
  4709.38
  4796.88
                   114.25 4825
114.54 4978.12
                                                 113.8 4846.87
113.34 4990.61
                                                                                114.17 4868.75
110.98 5009.37
  4968.75
                   109.97 5089.58
111.64 5227.93
                                                 110.02 5111.42
111.36 5249.98
                                                                                110.7 5146.86
111.42 5293.47
                                                                                                              111.26 5187.89
112.18 5308.03
                                                                                                                                            111.29
   5064.1
                                                                                114.79 5371.85
113.12 5453.1
113.88 5531.22
  5318 96
                   112.48 5337.48
                                                 112.48 5365.6
                                                                                                              114.26 5387.48
                   114.24 5412.48
113.69 5487.47
                                                 112.8 5440.59
114.35 5511.92
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5474.97

5634.34 5737.46 111.67 5562.47 111.35 5662.46

112.73 5753.08

112.24 5571.85 111.57 5681.21

112.74 5778.08 113.97 5857.82

111.67 5590.59 112.37 5687.46

113.64 5809.33 113.78 5821.83 116.53 5868.74 117.22 5879.66

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116.68
  6012.45
6090.57
                 112.96 6031.19
                                           112.18 6056.19
113.05 6115.56
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  6162.44
                 113.18 6171.82
                                            114.13 6184.31
                                                                       113.25 6215.56
                                                                                                    113.4 6228.06
                                                                                                                               114.3
                                                                                    6321.8
                 114.82 6278.06
                                            114.65 6287.44
                                                                       113.29
                                                                                                  114.43 6340.55
                                                                        114.6 6451.27
  6359.31
                 115.65 6374.93
                                            115.31 6403.05
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                                                                                                                             116.29
                115.93 6506.17
115.21 6634.29
                                            116.72 6531.18
114.54 6656.17
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115.52 6684.29
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114.7 6693.66
                114.45 6709.29
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  6699.91
                                           114.84 6740.54
112.46 6840.53
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111.97 6871.78
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112.63 6881.16
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113.58 7212.23
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112.21 7117.56
112.73 7226.8
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112.71 7131.15
112.46 7252.29
  6903.03
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  7044.74
                112.16 7065.52
114.08 7197.67
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  7412.39
                112.27 7424.89 110.81 7448.92 111.35 7462.38 114.78 7506.13 115.42 7521.75 114.74 7531.32 104.47 7562.13103.2716 7566.37102.7521 7576.18 93.86 7651.87 92.41 7680.75 90.53 7700.59 90.88 7749.48 92.33 7759.25 94.09 7788.59 97.36 7827.7 97.38 7850.5899.25404 7866.8 104.72 7924.03105.4948 7944.08 106.94 7956.9 111.1 7992.25 109.65 8009.92 110.79 8016.99
  7484.26
7552.35
                                                                                                 112.55 7538.97
101.55 7607.28
                                                                                                  88.63 7729.92
95.52 7808.14
102.05 7892.32
  7622.83
  7817.92
                                                                                                                               102.4
                                                                                                  112.57 7964.08112.3779
110.77 8031.12 112.27
  7913.28
  7971.03
  8038.19
8133.64
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110.32 8154.84
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109.47 8180.51
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108.97 8194.84
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109.02 8203.44
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108.26 8257.85
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114.8 8687.48
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8796.3
                115.52 8721.85
115.53 8802.03
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114.87 8807.76
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115.08 8844.12
                                                                       115.58 9205.83
116.35 9549.49
116.48 9897.47
                                           115.49 9158.71
116.66 9413.21
                                                                                                  115.84 9264.75
116.22 9618.22
  8925 18
                 115.11 9042.06
                  116.2 9349.58
  9314.24
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                116.12 9818.7
116.2110019.17
115.7710116.63
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116.0210045.93
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116.4210240.34
115.93 10410
10113.09
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10183.79
                118.0810197.93
115.410282.75
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115.5810385.27
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                115.9210560.43
115.77 10795.3
10473 64
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117.7510998.61
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10936.69
                115.6210964.96
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                                                                       116.6611074.34
 11114.4 114.9611123.51
                                            116.311143.54 116.19 11165.4 114.7411174.51 115.08
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .154 7956.9 .066 7992.25 .015 8223.48
                                                                                                  n Val Sta
.066 8266.44
Bank Sta: Left Right 7521.75 7956.9
                                                                                                     Coeff Contr.
                                            Lengths: Left Channel
                                                                                                                               Expan.
                     75 7956.9 1754.79 1830.6 1749.92
Station=40.85333 Elevation=133.466
                                                           Elevation=133.4667
Left Levee
Right Levee
                          Station=11021.52
                                                               Elevation= 118.92
Blocked Obstructions num=
Sta L Sta R Elev Sta L
6812.41 7521.75 114.01 7956.9
                                                            2
                                                           Sta R
                                                           10000 112 57
CROSS SECTION
RIVER: Rio Grande
                                           RS: 178.5
```

REACH: Lower Reach

Description: RGV-03, Bathymetric elevations translated from IBWC 2008 Cross-sections Station Elevation Data num=
Sta Elev Sta Ele
0 132.3 16.4 127.6 32.8 122.29 45.91 117.23 163.98 117.5 170.54 116.97 305 117.25 327.96 117.7 416.51 117.28 429.62 116.86 511.61 117.2 537 °F Elev 127.63 62.31 116.36 203.33 117.24 360.75 117.13 117.07 134.46 117.91 236.13 116.66 117.39 203.33 68.87 117.79 117.11 115.86 370.59 396.83 116.88 459.14 117.7 501.77 590.32 117.78 116.76 511.61 600.16 117.2 117.53 610 116.93 567.37 629.68 718.23 115.86 849.41 113.12 987.15 112.6 669.03 829.73 117.09 109.59 688.71 839.57 119.05 110.79 649.36 118.23 734.63 751.02 109.37 865.81 114.59 924.84 112.76 1039.63 112.83 112.77 967.48 1049.47 113.08 113.43 112.6 1000.27 113.14 1069.14 882.21 1059.3 1013.39 113.67 1147.85 113.9 1226.56 112.23 1347.91 1092 1 112.86 1115.06 113 67 1138 01 114 15 1157 69 113.88 1203.61 112.25 1292.16 113.63 1216.73 111.96 1321.67 113.22 1239.68 112.17 1400.38 1272.48 1459.42 1607 114.11 1469.25 115.59 1639.79 113.8 1515.17 115.08 1682.43 114.68 1531.57 114.98 1718.5 114.63 1564.36 115.9 1738.18 114.98 1718.5 114.51 1843.13 115.74 1931.68 116.16 2039.91 111.32 2121.89 113.64 2187.49 116.06 2272.75 111.06 2384.26 1744.74 1869.37 115.85 1757.86 115.16 1895.6 115.97 1990.71 114.81 1774.26 114.93 1912 115.07 1856.25 115.57 1941.52 116.77 2046.46 116.48 2013.67 114.68 2112.06 1971 03 2105.5 109.67 2135.01 109.13 2174.37 110.45 2184.21 113.01 2197.32 2164.53 116.32 115.8 2213.72 115.76 2341.62 116.84 2246.52 112.14 2354.74 116.1 2282.59 109.78 2436.73 2203.88 2315.39 2466.25 109.39 2482.65 108.64 2718.77 110.09 2525.28 109.47 2745.01 111.19 2581.03 110.55 2767.97 109.95 2607.27 112.82 2804.04 111.21 2836.84 109.44 2981.14 110.96 3171.35 112.27 2827 109.63 2935.22 111.31 2853.23 109.75 3000.81 110.19 2872.91 109.52 3050.01 2817 16 110.02 3220.54 3072.96 110.19 3105.76 110.59 3243.5 110.19 111.06 3397.64 111.96 3545.22 110.47 3364.84 111.5 3502.59 111.34 3387.8 112.41 3522.26 3279.58 110.53 3299.25 3423.88 111.28 3453.39 3597.69 3699.36 111.68 3617.37 111.71 3709.2 112.1 3633.77 111.32 3719.04 111.43 3663.28 111.92 3751.83 112.02 3679.68 111.92 3761.67 111.54 112.25 3827.26 112.95 3968.28 112.15 3876.46 114 3978.12 112.55 3899.41 113.39 3987.96 114.13 4063.39 3814.14 112.29 3925.65 112.39 113.76 4001.08 4007.64 113.88 4043.71 114.69 4053.55 114.84 4083.07 114.42 4132.26 116.65 4201.13 116.21 4138.82 116.93 4207.69 115.5 4158.5 117.81 4217.53 116.12 4178.18 115.3 4224.09 4188.01 115.3 4224.09 114.51 4296.24 115.11 4388.07 116.2 4483.18 4247.05 4325.76 113.69 4253.61 115.71 4348.71 115.65 4263.44 114.89 4368.39 115.93 4286.4 115.77 4378.23 115.3 4447.1 114.99 4548.77 4427.42 114.89 4437.26 116.95 4473.34 115.46 4584.84 4617 64 115 21 4624 2 115 97 4640 6 115.1 4656.99 115 4670.11 115 49 116.66 4706.19 114.95 4719.31 115.57 4827.53 115.83 4738.98 114.57 4853.77 4768.5 115.83 4778.34 114.98 4801.29 116.39 4899.68 117.72 4971.83 116.19 4922.64 117.73 4991.51 117.25 4932.48 115.89 5021.03 115.79 4948.88 115.35 5043.98 4965.27 117.49 5093.18 116.66 5103.02 116.81 5112.85 115.98 5135.81

```
108.93 5286.67
 5467.05
              109.96 5493.29
                                      110.59 5526.08
                                                              110.45 5558.88
                                                                                      111.58 5588.39
                                                                                                              114.53
  5667.1
              113.63 5680.22
                                      115.63 5690.06
                                                              115.07 5703.18
                                                                                     113.36
                                                                                                  5716.3
                                                                                                              114.27
              114.36 5742.53
114.44 5795.01
                                                              113.41 5768.77
114.17 5824.52
 5729.42
                                      113.55 5762.21
                                                                                       114.6 5775.33
                                                                                      113.76 5850.76
 5781.89
                                      115.02 5804.85
 5860.6
5958.99
              114.42 5870.44
114.78 5978.66
                                      113.82 5899.95
115.69 5995.06
                                                              114.19 5919.63
115.53 6021.3
                                                                                      115.37 5926.19
116.27 6031.14
                                      116.17 6080.33
117.16 6195.12
115.61 6286.94
116.94 6362.37
              116.75 6067.21
117.47 6182
115.44 6267.27
                                                              116.78 6086.89
117.37 6204.95
 6054.09
                                                                                      116.32 6139.36
116.64 6237.75
                                                             114.5 6313.18
115.99 6375.49
117.41 6447.64
117.58 6555.87
117.88 6647.7
                                                                                      115.33 6319.74
116.23 6385.33
115.91 6480.44
 6254.15
              116.76 6349.26
116.63 6424.69
                                      116.11 6434.53
 6398.45
                                                                                                                115.8
                                      117.84 6546.03
118.79 6637.86
                                                                                      115.54 6591.94
118.13 6677.21
 6493.56
              117.12 6529.63
              117.37 6631.3
 6611.62
                                                                                                              116.43
                                      118.13 6765.76
117.56 6844.47
117.79 6982.21
117.41 7106.84
114.89 7201.95
                                                                                      118.26 6798.56
118.08 6919.9
117.43 6998.61
115.49 7136.35
115.78 7234.74
 6739.53
              117.27 6746.09
118.15 6818.24
                                                              117.3 6785.44
117.07 6883.83
              118.36 6972.38
118.27 7057.65
115.43 7178.99
                                                              118.66 6988.77
117.51 7119.96
116.33 7221.62
 6942.86
 7169.15
                                                                                                              114.65
              115.43 7176.99
115.54 7306.89
114.29 7441.36
114.17 7647.97
112.63 7736.52
  7274.1
7418.4
                                      114.52 7329.85
114.88 7474.15
                                                              114.1 7372.48
114.41 7520.07
                                                                                      115.25 7395.44
114.55 7546.3
                                                                                      114.55 /546.3
113.32 7703.72
111.01 7788.99
 7611.89
7716.84
                                      114.61 7664.37
113.2 7749.64
                                                              114.46 7687.32
110.84 7762.75
              110.98 7811.95
106.04 7886.3
89.55 7996.3
                                      115.13 7834.91
103.45 7906.3
                                                                          7851.3
7916.3
                                                                                      115.85 7857.86
92.55 7946.3
 7802.11
                                                              116.77
                                                                                                              113.63
                                      115.13 7834.91
103.45 7906.3
91.55 8016.3
94.95 8086.3
105.12 8215.33
                                                                                       91.95 8046.3
  7966.3
                                                               90.95 8026.3
                                                                                                                92.95
  8056.3
              93.95 8076.3
103.55 8212.05
                                                              96.65 8096.3
105.47 8228.45
                                                                                        96.65 8116.3
  8136.3
                                                                                      112.92
                                                                                                     8235
                                                                                      110.13 8297.31
107.05 8372.74
              110.77 8261.24
112.21 8323.55
 8241 56
                                      108.67 8277.64
                                                              110.29 8284.2
                                                                                                              112 62
                                      108.82 8336.67
 8303.87
                                                              109.38 8356.34
                                                              108.38 8356.34
108.39 8471.12
108.79 8713.8
112.44 8920.41
113.22 9136.85
114.59 9487.76
                                                                                      108.39 8530.16
111.78 8746.6
112.72 8949.93
 8392.42
                                      108.73 8431.77
107.91 8700.69
              109.92 8412.09
              111.74 8854.82
    8763
                                      112.52 8881.06
                                                                                                              112.53
 8992.56
9343.46
              112.87 9038.47
114.08 9412.33
                                      112.89 9051.59
114.62 9441.85
                                                                                      113.18 9235.24
115.04 9520.55
115.17 10009.2
              115.38 9681.25
115.0510101.02
                                      115.3 9769.79
115.1710137.09
 9579 58
                                                              115.41
                                                                          9832.1
                                                              114.9210166.61
10028.87
                                                                                      114.9810186.29
10219.08
              115.0810228.92
                                       114.6 10232.2
                                                               115.610251.88
                                                                                      115.1610271.55
                                      118.0910307.63
                                                             120.6410314.19
                                      114.1410386.33
115.1710602.78
114.74 10838.9
                                                                                      114.4810481.44
114.66 10711
114.85 10871.7
10346.98
              114.3810379.78
                                                               114.510428.97
                                                                                                              114.99
              114.710563.43
114.9910812.67
                                                              114.8710665.09
 10727.4
                                                               115.110861.86
                                                                                                              115.27
10920.89 114.9810976.64 115.5410993.04
11071.74 118.5111088.14 116.7511097.98
                                                              114.9811019.27
                                                                                      117 0911038 95
                                                             115.1511134.05 114.1411163.57
Manning's n Values
      Bank Sta: Left Right
                                      Lengths: Left Channel
                                                                                         Coeff Contr.
                       1087.82 1400 1513.92

Station= 0 Elevation= 132.3

Station=11071.74 Elevation= 118.5
            7851.3 8228.45
                                                                                                    .1
Left Levee Station=
                                                                           132 3
                                                        Elevation= 118.51
                                                    2
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R Elev
7664.37 7811.51 114.94 8235 8854.82 112.52
CROSS SECTION OUTPUT Profile #Design Flow
                                                        Element
                                                                                                               Channel
                                                       Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                0.154
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                           0.09
                                                                                                                 0.037
                                         131.98
                                                                                              1087.82
                                                                                                              1400.00
                                                                                                                               1513.92
                                                                                            139518.80
                                                                                                              12809.16
                                         118.78
                                                                                                                               51891.78
                               0.000104
235000.00
11162.46
  E.G. Slope (ft/ft)
                                                        Area (sq ft)
                                                                                            139518.80
                                                                                                              12809.16
                                                                                                                               51891.78
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                             93272.66
                                                                                                              54751.95
                                                                                                                               86975.38
                                                         Flow (cfs)
                                                       Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                      11162.46
                                                                                              7850.19
                                                                                                                377.15
                                                                                                                               2935.12
                                                                                               0.67
17.77
                                                                                                                   4.27
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                           42.43
                                                                                                                 33.96
                                                                                                                                 17.68
                                      23068850.0
                                                                                               9156141.0
                                                                                                                 5374743.0
                                                                                                          384.91
                                                                                                                              2955.24
                                       1315.72
                                                                                              7865.48
                                                        Shear (lb/sq ft)
        Ch El (ft)
                                           89.55
                                                                                                                  0.22
                                                        Stream Power (lb/ft s)
                                                                                                  0.08
                                                                                                                   0.92
  Alpha
                                            4.13
                                                                                                                                   0.19
  Frctn Loss (ft)
C & E Loss (ft)
                                                                                       265274.90
                                            0 13
                                                        Cum Volume (acre-ft)
                                                                                                              84337.12
                                                                                                                              271335 90
                                                                                                              3290.76
                                                      Cum SA (acres)
                                                                                            27404.14
Warning: The cross-section end points had to be extended vertically for the computed water surface.
             Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                      RS: 178.23*
REACH: Lower Reach
TNPUT
Description: RGV-03.
Station Elevation Data
                                      num=
                                                    460
      Sta Eiev
0 130.68
                                                    Sta
21.95
                 Elev Sta
                                         Elev
                                                                                    126.41 54.52 119.49
114.03 211.46 113.92
116.58 319.38116.6406
                                      132.95
                                                                         35.15
178.77
282.65
                             8.75
                                                             130.22
              117.18
114.49
                         124.25
246.35
                                      115.64
114.39
                                                 172.23
262.85
    70.87
  234.35
                                                              115.02
                                                                         404.38
509
607.09
  328.85
437.07
              116.82
116.03
                          368.45
464.15
                                      116.1
116.58
                                                  378.22
492.66
                                                              116.56
116.1
                                                                                      116 424 116.31
116.5 518.81 116.09
                                                  574.4
675.76
                                                              115.28
                                                                                     116.37
117.36
  544.97
              116.43
                          558.05
                                      115.56
                                                                                                    616.9 115.99
                                                              116.06
                                                                          695.38
                                                                                                 724.81 115.28
  636.52
              116.14
                          656.14
                                      116.82
   741.16
              111.33
                            757.5
                                      110.83
                                                  790.84
                                                              110.98 835.97
114.16 906.34
111.37 1005.99
                                                                                      110.94 845.78
                                                                                                               111.8
              113.31
111.46
                          871.94
973.3
                                                   888.29
                                                                                      113.51 922.84 112.13
112.18 1040.45112.0571
  936.04
                                                  992.91
                                      111.66
```

1074.66

1162.94

1256.14

1629 04

1859.39

1965.64

2094.81

2166.74

112.6 1097.55 112.76 1200.04

112.11 1297 112.97 1473.56

114.36 1748.22

112.65 1883.14

113.53 1998.64 113.71 2107.89

109.01 2176.55

112.05 1120.44 112.61 1221.8

111.49 1325.44 112.8 1516.84

114.7 1761.3 113.12 1898.62

113.86 2016.33 112.69 2114.43

109.89 2186.36

113 96 1648 84 114 08 1665 34

112.63 1143.32 112.8 1231.6

111.72 1352.58 113.44 1553.14

113.76 1678.54 113.1 1777.65 112.86 1914.97

111.98 2189.63

112.78 1153.13 113.13 112.41 1244.68 112.55

114 75

108.88

111.66 1398.04 113.65 1592.74

113 9 1698 34

113.39 1939.24

111.55 2199.43

113.69 2042.49 114.1 2054.74 110.46 2124.23 109.38 2137.31

111.09 941.97 110.05 111.33 1038.46111.4544

112.12 1205.17 111.52

111.27 1412.44

112.32 1494.69 112.34 1596.68

112.49 1682.22

```
2317.14 113.51 2343.29
2467.24 109.15 2483.9
                                                                                 110.43 2581.98
109.95 2747.73
112.45 2827.21
                   109.15 2483.9
108.77 2718.03
                                                  109.68 2526.4
109.27 2737.83
                                                                                                               109.59 2608.14
                                                                                                                                              108.85
  2774.13
                                                                                                                                             111.62
                    112.78 2804.32
                                                  112.26
                                                                2817.4
                                                                                                                111.56 2837.02
                                                                                                               111.06 3000.49
111.77 3166.83
   2863.23
                    110.57 2916.03
                                                    110.4 2949.03
                                                                                 110.43 2975.43
   3061.23
                    111.59 3074.43
                                                  111.28 3087.63
                                                                                 111.69 3133.83
                                                                                                                                               110.56
                   111.4 3189.93
109.67 3363.42
                                                  110.98 3213.03
110.25 3386.31
                                                                                 110.95 3229.53
110.06 3396.12
                                                                                                              109.63 3242.45
110.28 3451.7
   3298.03
                                                                                                                110.8 3615.19
110.8 3706.74
   3500.75
                    110.96 3520.37
110.62 3660.96
                                                  110.66 3552.93
111.06 3677.31
                                                                                111.14 3595.57
110.73 3696.93
                   110.93 3749.24
111.26 3958.5
112.31 4040.24
                                                  110.95 3759.05
111.65 3965.04
112.93 4050.05
                                                                                110.75 3811.36
112.35 3974.85
112.68 4059.86
115.07 4154.68
   3716.55
                                                                                                                  111.2 3873.5
                                                                                                                                               111.36
                                                                                                               111.95 3997.74
113.57 4079.48
  4004.28
                     114.4 4113.93
                                                  115.26 4135.06
116.03 4203.72
                                                                                                               115.42 4174.3
114.97 4220.07
  4086.02
                    115.89 4197.18
                                                                                 116.62 4213.53
    4184.1
                                                                                                                                                114.5
                  115.89 4197.18

114 4249.51

114.71 4363.94

115.2 4442.41

114.85 4543.77

115.55 4651.67

114.91 4713.8

115.27 4821.69
                                                                                                              114.97 4220.07
114.26 4321.44
115.18 4422.79
114.85 4491.45
114.88 4612.44
115.17 4684.37
115.84 4873.62
                                                                                115.43 4292.01
115.01 4384.53
115.7 4478.38
114.42 4592.82
115.43 4671.29
  4242.97
4344.32
                                                  115.29 4259.31
115.44 4373.75
                                                  116.19 4468.57
115.27 4579.73
114.97 4664.75
  4432.6
4537.23
                                                                                                                                               114.63
  4618.98
                                                                                                                                               116.28
                                                 115.45 4733.41
114.62 4856.44
                                                                                115.19 4762.84
115.59 4877.27
   4700.72
   4795.53
                   116.37 4926.32
115.53 4998.34
                                                  115.4 4942.68
115.29 5037.49
                                                                                 115.22 4959.02
115.41 5060.38
                                                                                                               116.73 4965.56
116.71 5086.54
  4916.51
  4985.18
                                                                                115.41 5060.38
115.9 5165.01
110.17 5265.65
109.51 5449.47
110.41 5580.25
112.11 5658.73
                                                  115.55 5129.04
110.89 5236.94
111.05 5387.75
                   116.11 5106.15
112.28 5207.51
  5096.35
                                                                                                                115.68 5174.82
                                                                                                                                                114.6
                                                                                                               109.48 5459.28
112.38 5586.79
111.78 5671.81
  5311.85
                     111.1 5364.65
                                                                                                                                               109.33
                   111.1 5364.05
109.75 5518.13
112.65 5629.3
112.74 5694.7
111.63 5760.09
  5485.44
5603.14
                                                  109.66 5550.83
111.93 5635.84
                                                  111.6 5707.78
112.42 5766.63
  5681.62
                                                                                  112.2 5720.86
                                                                                                               112.26 5733.93
   5753.55
                                                                                 111.61 5786.25 113.79 5806.86
                   114.61 5851.64
115.33 5949.73
                                                  114.89 5861.45
115.12 5969.34
                                                                                114.44 5890.87
115.71 5985.69
                                                                                                               114.85 5910.49
115.65 6011.85
  5829.96
                                                                                 116.04 6070.71
  6021.67
                    115.85 6044.55
                                                  116.44 6057.63
                                                                                                                116.49 6077.25
                                                                                                                                              116.21
  6129.56
6227.65
                     116.2 6145.91
116.3 6244
                                                  116.89 6172.07
115.74 6257.08
                                                                                 116.68 6185.15
115.72 6272.17
                                                                                                               116.87 6194.95
115.16 6309.39
                   116.3 6244
116.51 6338.82
116.35 6414.03
                                                  116.67 6351.9
116.02 6423.84
117.22 6535
                                                                                                               116.1 6374.79
115.83 6469.61
  6321 67
                                                                                 116.07 6364.98
                                                                                 116.85 6436.91
  6482.69
                    116.65 6518.65
                                                                                 117.03 6544.81
                                                                                                                115.71 6580.77
                                                 117.22 6535
117.75 6626.55
117.5 6754.07
116.97 6832.54
117 6969.86
                                                                                117.03 6544.81
117.19 6636.36
116.88 6773.69
116.58 6871.78
117.62 6976.4
                                                                                                               115.71 6580.77
117.31 6665.78
117.37 6786.77
117.23 6907.74
116.82 6986.21
                  116.88 6620.01
116.83 6734.46
117.33 6806.39
117.41 6960.06
117.32 7054.29
115.88 7166.05
113.6 7278.69
113.26 7456.9
112.58 7585.6
110.96 7689.19
109.64 7774.21
  6727.92
  6799.85
  6930.63
                                                                                                                                               117.25
                                                  116.89 7094.12
114.09 7188.94
113.18 7316.45
                                                                                                               115.53 7133.49
113.77 7221.63
113.31 7381.84
  7018.91
7143.39
                                                                                 117.04 7110.39
114.19 7208.55
   7260.87
                                                                                112.66 7364.49
                                                                                                                                              112.69
                                                                                112.66 7364.49
113.15 7516.3
111.62 7633.61
110.54 7721.89
110.16 7797.1
                                                                7476.7
                                                                                                                113.08
                                                                                                               113.08 7546 113.59

111.71 7664.8 111.33

110.94 7734.97 109.33

113.48 7806.7 115.16

110.89 7870.02 105.41

93.67 7955.13 93.0889
                                                 112.93 7476.7
111.83 7615.3
111.25 7702.27
109.39 7787.29
115.63 7839.86
103.1 7930.05
    7572.4
    7763.8
                                                                               114.64 7846.94
96.38 7947.62
  7819.99 116.25 7836.33 7873.33105.1185 7896.25
                                                 103.1 7930.05 96.38 7947.62

89.98 8033.22 89.18 8056.33

94.7 8137.6795.30705 8148.74

100.96 8192.03 102.02 8214.37

113.69 8240.62113.5607 8246.19

111.87 8293.31 113.54 8298.85

109.95 8357.06 110.44 8373.7

110.64 8477.63 110.3 8518.98
                  90.73 7998.98
93.45 8125.64
101.48 8184.59
  7986 28
                                                                                                                 90.61 8071.73
  8117.94
8177.15
                                                                                                               102.89 8225.01
                                                                                                                                               106.07
  8227.57108.0017 8235.11
                                                                                                                112.31 8262.82
  8276.68 112.04 8282.23
8326.58 111.53 8343.2
8406.95 110.6 8462.12
                                                                                                                113.32 8315.49
                                                                                                                                              111.13
                                                                                                               111.85 8389.76
110.33 8570.68
111.78 8764.51
                                                  109.98 8645.32 111.93 8686.91
111.78 8880.93 111.9 8919.73
112.14 9177.51 112.24 9235.71
                   109.62 8634.24
112.01 8844.9
  8595 43
                                                                                                                111.81 8930.82
                    111.82 9086.04
  8979.01
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113.28 9650.97
                                                  113.5 9377.07
113.34 9723.34
                                                                                113.3 9463
113.57 9756.81
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113.37 9817.79
    9590.5
                                                                                                                                               113.48
                   113.39 9889.86
113.52 9961.92
                                                  113.21 9917.57
112.32 9975.78
                                                                                 113.46 9925.89
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 10014.58
                                                  113.0610053.39
                                                                                 112.9310058.93
                                                                                                                113.1910139.32
                                                                                                                                               113 37
                                                    113.610240.24
                                                                                 113.5910276.42
                                                                                                                113.9310333.34
  10347.2
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                                                 114.1610419.27
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114.9810571.72
                                                                                                               114.6810460.84
                                                                                                                                              114.56
10469.16 114.8510510.74 114.7710557.86
10622.74 118.3410638.23 118.9710656.66
                                                                                                              114.5410602.05
116.1110702.73
                                                                                116.75 10682
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .154 7836.33 .066 7896.25
                                                                                n Val
                                                                                                                 n Val
                                                                      Sta
                                                                                  .015 8177.15
                                                                                                                  .066 8235.11
Bank Sta: Left Right Lengths: Left Channel Right
7836.33 8235.11 1087.82 1400 1513.92
Left Levee Station=8.746667 Elevation=132.9467
Right Levee Station=10641.51 Elevation= 119.04
Blocked Obstructions
                                                                                                                   Coeff Contr.
                                                                                                                                                 Expan.
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | T110.39 | 7836.33 | 115.53 | 8235.11 | 8645.32 | 111.93 |
CROSS SECTION
 RIVER: Rio Grande
 REACH: Lower Reach
                                                  RS: 177.97*
 Description: RGV-03.
 Station Elevation Data
        Sta Elev Sta
0 129.06 13.12
3.13 121.75 79.43
                                                                   Sta
17.49
86.58
                                                    Elev
                                                                                                      Sta
                                                  133.04
                                                                               133.59 30.65 131.91
116.98 116.19 115.52
                                                                                                                             43.81 128.46
132.64 114.5
                                                  112.34
113.49
                                                                                  111.1 201.73 110.66
115.85 318.77115.9255
    158.96 113.29 168.83
                                                                      187
                                                                                                               110.66
                                                                                                                               234.63
                                                                                                                                              110.65
                                                                  290.56
                                                                                 115.85
                                                                                                                               336.62
                     111.4
    346.49
                   115.44
                                  376.06
                                                  115.07
                                                                  385.84
                                                                                 115.33
                                                                                                411.93 115.13
                                                                                                                               431.49
                                  471.51
563.63
                                                  115.52
114.77
                                                                 499.94
593.24
                                                                                 115.09
                                                                                                516.23
603.11
                                                                                                               115.23
115.13
    552.09
                    115.15
                                                                                                                               643.37
    662.93
747.68
                   115.42
112.7
                                   682.48
763.98
                                                  115.03
                                                                  702.04
797.21
                                                                                 115.67
112.49
                                                                                                721.55
842.21
                                                                                                               114.84
                                                                                                                               731.38 114.69
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894.37

1050 84

1330.19

1445.34 1521.01

1606.55

113.72

912.36

111 3 1080 17

111.22 1343.35

111.56 1458.5 112.24 1527.59

112.89 1632.87

113.17

918.94

110.06 1004.48

111 46 1116 34

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112.66

928.81

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2037.54
                 111.41 1952
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                 112.67 2774.49
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                                             112.4 3000.17
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                 111.32 2975.18
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3175.87
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111.89 3212.06
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  3498.92
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  5901.35
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  6442.89
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115.88 6692.93
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  6742.37
                 116.46 6774.97
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7443.07
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111.79 7512.16
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111.93 7558.22 111.02 7571.38
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107.83 7742.46 108.25 7749.04
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104.77 7906.2 102.74
                 10.51 7836.38 108.03 7860.371
100.87 7946.6 97.8594 7966.43
89.66 8100.15 88.82 8116.35
91.94 8181.18 94.36 8194.15
99.73 8227.22 100.89 8233.821
  7831.37
                                                                                                       94.74 8033.67 90.86
89.59 8139.05 90.4521
99.05 8206.33 97.82
  7923.14
8060.73
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89.67 8127.16
  8159 57
                                                                           96.83 8201.11
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113.61 8289.31 114.46 8307.42
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                 112.85 8341.39
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112.55 8460.99
                                                                        113.77 8368.1
112.41 8473.64
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111.3 8748.08
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  9997.85
10175.17 115.5710192.07 118.3510204.73 119.4410215.35 118.3510241.89
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .154 7821.35 .066 7946.6 .015 8194.15
                                                                                                    n Val Sta
.066 8241.77
                                             Lengths: Left Channel Right
Bank Sta: Left Right
                                                                                                        Coeff Contr.
                                                                                                                                   Expan.
                                             1087.82
           7821.35 8241.77
                                                                         1400 1513.92
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 7804.97 115.72
 0 7804.97 115.72
8241.7710241.89 114.46
                      Station=17.49333
Right Levee
                           Station=10211.28
                                                                 Elevation= 119.57
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                             RS: 177.7
Description: RGV-03, Bathymetric elevations translated from IBWC 2008
                       Cross-sections
                                Data num=

Sta Ele

19.68 133.4
Station Elevation Data
                                            Elev
133.41
117.62
111.5
      Sta Elev
0 127.44
                                                            Sta Elev
26.24 134.24
                                                                                                     Elev
133.6
                                                                        134.24 39.36
116.93 124.64
109.92 190.24
                                                                                                                     52.48
                122.76 91.84
112.42 167.28
                                                         95.12
177.12
                                                                                                   114.84 141.04
108.4 209.92
      75.44 122.76
                                                                                                                                 113.36
   242 72
                107.14
                                 262 4
                                               108 4
                                                             278 8
                                                                         110 37 285 36
                                                                                                     111.57
                                                                                                                   298 48
                                                                                                                                 115 12
                                                           331.28
465.76
                                                                                       344.4
478.88
                                             114.43
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                 114.04
                               449.36
                                                                           114.1
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639.6
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114.27
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114.02
                                                                                       600.24
711.76
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728.16
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108.66 1010.23 109.05 1020.07

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947.91
1036.47
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111.23 1184.07
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112.08 2873.26
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    2833.9
  2915.9
2974.94
                      112.13 2929.02
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113.38 3024.14
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113.36 3047.1 113.66 3060.22
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109.17 3706.38
108.96 3935.98
                      111.82 3227.5
109.11 3601.42
    3211.1
                      109.02 3821.18
109.34 4044.22
114.58 4116.38
   3775.26
  4031.1
4106.54
                                                                                             113.06 4080.3
113.53 4129.5
                                                                                            113.53 4129.5
114.19 4237.74
114.23 4349.26
114.57 4467.35
114.59 4532.95
114.92 4647.75
                                                                                                                                114.49 4139.34
114.64 4254.14
114.47 4359.1
114.73 4473.91
114.92 4555.91
114.88 4660.87
  4165.58
4267.26
                      114.11 4175.42
                                                         114.39 4191.82
114.21 4323.02
115.06 434.54
114.42 4529.67
115.45 4634.63
114.49 4706.79
114.81 4792.07
114.62 4929.83
114.56 508.56
114.71 5097.12
                                                         114.39 4191.82
                      114.54 4280.38
                      114.46 4427.98
114.79 4509.99
114.72 4624.79
  4375.5
4496.87
  4611.67
                                                                                             114.83 4726.47
114.62 4808.47
114.61 4936.39
115.33 5018.4
114.69 5116.8
                     115.45 4696.95
114.64 4765.83
115.09 4860.95
115.06 4985.59
                                                                                                                                114.85 4739.59
114.74 4828.15
  4749.43
                                                                                                                                115.16 4949.51
114.65 5034.8
  4844 55
                                                                                                                                 115.22 5126.64
  5041.36
                      115.23 5074.16
                                                                                                                                115.12 5198.8
112.27 5264.4
                                                         115.26 5175.84
                                                                                              114.88 5185.68
                     114.76 5166
114.33 5218.48
112.9 5297.2
111.88 5349.68
108.07 5762.97
119.27 5799.05
                                                         114.07 5231.6
114.01 5303.76
112.51 5356.24
                                                                                             112.43 5251.28
113.29 5313.6
111.82 5366.08
                                                                                                                                112.27 5264.4
113.46 5323.44
108.74 5372.64
  5205.36
  5339.84
                                                         112.51 5356.24
109.09 5772.81
117.3 5812.17
115.77 5956.5
115.73 6058.18
115.76 6209.06
116.64 6268.1
115.97 6327.14
                                                                                            112.93 5779.37
116.1 5844.97
115.75 5976.18
115.98 6074.58
                                                                                                                               116.1 5789.21
115.67 5861.37
   5753.13
                      116.15 5933.54
115.89 6031.94
  5897 46
                                                                                                                                       116 5989.3
                                                                                                                                 115.84 6146.74
                     115.89 6192.66
115.96 6261.54
117.35 6310.74
115.59 6425.55
115.69 6481.31
                                                                                            115.88 6222.18
116.28 6284.5
116.35 6353.38
115.76 6441.95
115.92 6527.23
                                                                                                                               115.84 6146.74
116.37 6238.58
116.65 6287.78
115.57 6379.62
116.3 6451.79
116.35 6540.35
  6166.42
6251.7
6300.9
                                                                                                                                                                     116.01
                                                         115.98 6432.11
116 6520.67
115.56 6602.67
115.8 6717.47
115.58 6838.83
  6412.43
6464.91
                                                                                                                                115.49 6681.39
115.71 6760.11
115.32 6874.91
                      116.36 6592.83
116.57 6701.07
115.79 6799.47
                                                                                             115.82 6628.91
116.49 6740.43
115.68 6858.51
  6556.75
  6783.07
                     115.79 6799.47
115.41 6910.99
115.44 7019.24
118.33 7107.8
110.02 7173.4
109.59 7337.4
110.42 7429.25
111.49 7517.81
                                                         115.58 6838.83
115.55 6930.67
115.93 7029.08
118.43 7117.64
109.7 7209.48
109.92 7360.36
109.88 7448.93
112.58 7527.65
                                                                                                                                                                    115.56
                                                                                             115.06 6858.51
115.36 6953.64
115.81 7048.76
117.31 7130.76
109.91 7252.12
                                                                                                                                115.63 6966.76
116.32 7084.84
  7002.84
                                                                                                                                                                    115.91
  7101.24
                                                                                                                                114.12 7147.16
109.58 7265.24
  7327.56
                                                                                             109.57 7383.32
110.54 7468.61
110.84 7544.05
                                                                                                                                110.14 7406.29
110.08 7488.29
   7416.12
                                                                                                                                 109.47 7557.17
  7498.13
                      106.08 7622.77
106.53 7711.33
                                                         105.76 7635.89
106.28 7727.73
                                                                                             106.54 7645.73
106.98 7734.29
                                                                                                                               106.16 7668.69
107.66 7744.13
  7678.53
                      107.92 7767.09
113.63 7819.34
                                                         110.06 7776.93
108.54 7825.82
                                                                                             113.84 7790.05
105.17 7829.07
                                                                                                                                115.2 7806.38
105.12 7849.07
   7812.86
                                                         108.54 7825.82
102.36 7938.07
95.85 8040.07
88.65 8167.07
96.63 8228.07
115.74 8281.02
115.7 8346.43
114.91 8441.41
111.89 8559.33
109.27 8719.82
108.93 8949.1
                                                                                                                                98.75 7978.07
92.35 8081.07
88.95 8203.07
97.45 8240.07
115.62 8313.67
                      103.25 7917.07
97.35 8011.07
89.55 8150.07
                                                                                             100.96 7961.07
93.93 8060.07
88.45 8184.07
   7891 07
  8116.07
                                                                                                                                                                         90.6
                      93.43 8225.07
115.23 8271.24
                                                                                             94.68 8231.07
115.19 8290.8
  8248.43
                      115.54 8336.6
114.62 8428.31
                                                                                             114.87 8392.28
113.82 8461.07
                                                                                                                                 115.53 8402.11
112.99 8480.72
   8320.22
  8418.49
                                                                                                                                                                     113.06
                      112.28 8533.12
109.71 8696.89
                                                                                             111.29 8624.84
109.08 8742.75
                                                                                                                                110.52 8641.21
109.15 8811.53
   8503.65
                                                                                                                                                                     110 15
  8837 74
                      108 51 8903 24
                                                         108 93 8949 1
                                                                                              108 96
                                                                                                               8975.3
                                                                                                                                 109 18 9044 09
                      109.55 9145.62
110.21 9260.26
                                                         109.58 9168.55
110.07 9273.36
                                                                                             109.98 9191.48
110.22 9351.97
                                                                                                                                 110.23 9378.18
  9230.78
  9391.28
9519.02
                    110.33 9410.93
110.99 9541.95
                                                         110.69 9430.58
112.34 9558.32
                                                                                             110.69 9456.79
112.72 9591.08
                                                                                                                                110.08 9492.81
113.15 9610.73
  9620.55 113.29 9633.66 113.39 9650.03
9731.92 113.58 9748.29 114.53 9761.4
                                                                                           113.96 9669.69
118.35 9771.22
                                                                                                                                114.03 9695.89
119.9 9781.05
                                           Sta n Val Sta
18.16 .12 7938.07
          Sta n Val Sta
0 .085 318.16
                                                                                              n Val Sta
.025 8240.07
                                                         Lengths: Left Channel Right 2073.72 1400 1374.03 2
Bank Sta: Left Right 7806.38 8248.43
                                                                                                                                     Coeff Contr.
Ineffective Flow num=
Sta L Sta R Elev
0 7806.38 115.18
                                            Elev Permanent
0 7806.38 115.18 T
8248.43 9781.05 115.23 T
Left Levee Station= 26.24 Elevation= 134.24
Right Levee Station= 9781.05 Elevation= 120.1
Blocked Obstructions num= 3
Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev
3121.13 3554.93 109.4 5205.63 5780.28 114.37 7076.06 7515.49 112.68
CROSS SECTION OUTPUT Profile #Design Flow
    E.G. Elev (ft)
Vel Head (ft)
                                                                                    Element
Wt. n-Val.
                                                                                                                                                                       Channel
                                                                                                                                                                                             Right OB
                                                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                           0.06
131.46
                                                                                                                                                                         0.062
                                                                                                                                           2073.72
                                                                                                                                                                                             1374.03
    W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                                                     1400.00
    E.G. Slope (ft/ft)
                                                         0 000184
                                                                                                                                        146433 20
                                                                                                                                                                    15331.31
                                                                                                                                                                                             30835 56
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                                                                                       442.05
                                                                                                                                                                                             1532.62
                                                                1.43
                                                                                                                                                                           3.37
                                                                                                                                             16.09
                                                                                                                                                                         34.68
    Conv. Total (cfs)
Length Wtd. (ft)
                                                        17301800.0
                                                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                              9962627.0
                                                                                                                                                                         3801378.0
                                                                                                                                                                                                    3537790.0
```

```
Shear (lb/sq ft) 0.19
Stream Power (lb/ft s) 0.20
Cum Volume (acre-ft) 254557.50
Cum Ch (acres) 26819.38
                                                               88.45
1.94
0.28
                                                                                                                                                                       0.39 0.18
1.30 0.36
82969.39 266944.40
3251.26 28748.02
Min Ch El (ft)
Alpha
Frctn Loss (ft)
C & E Loss (ft)
                                                                0.01
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 177.40*

| INPUT | DOW | 0.2 | | | | | | | |
|------------------------|------------------|--------------------|------------------|--------------------|-----------------|--------------------|------------------|--------------------|------------------|
| Descripti
Station E | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 124.44 | 9.8 | 125.8 | 19.61 | 127.64 | | 127.63 | 26.61 | 126.41 |
| 56.01 | 128.38 | 61.62 | 130.87 | 75.62 | 133.75 | 79.82 | 134.05 | 92.34 | 133.3 |
| 104.85 | 130.28 | 126.75 | 123.09 | 142.4 | 118.32 | 152.44 | 116.86 | 173.69 | 115.4 |
| 189.33 | 113.85 | 214.36 | 111.65 | 223.75 | 110.4 | 236.27 | 109.22 | 255.04 | 108.52 |
| 286.33 | 108.49 | | .09.7075 | 327 | 111.95 | 339.52 | 114.47 | 358.29 | 115.18 |
| 370.81 | 114.92 | 383.32 | 115.16 | 392.71 | 114.55 | 420.87 | 114.34 | 453.82 | 114.58 |
| 483.45
567.93 | 114.55
114.13 | 499.09
636.77 | 114.34
114.48 | 511.61
649.28 | 114.6
114.23 | 537.33
664.93 | 114.37
114.41 | 555.49
677.44 | 114.41 |
| 733.76 | 114.13 | 749.41 | 114.40 | 765.05 | 114.23 | 786.95 | 114.41 | 821.36 | 114.25 |
| 833.88 | 114.08 | 896.81 | 114.06 | 930.88 | 113.58 | 937.13 | 113.16 | 946.52 | 111.73 |
| 959.04 | 110.78 | 996 | | 1018.49 | | 1027.87 | | 1043.52 | 112.28 |
| 1068.55 | | 1124.87 | | 1169.13 | | 1190.92 | | 1205.44 | 109.28 |
| 1216.34 | | 1234.49 | | 1253.15 | | 1262.54 | | 1285.32 | 110.34 |
| 1306.35 | 110.19 | 1328.25 | 110.29 | 1340.76 | 110.15 | 1372.05 | | 1397.08 | 110.18 |
| 1406.47 | 110.35 | 1437.76 | 110.13 | 1450.28 | 110.31 | 1465.92 | 110.19 | 1478.44 | 110.81 |
| 1484.69 | | 1509.73 | | 1515.98 | 110.97 | 1528.5 | | 1544.14 | 110.5 |
| 1581.69 | | 1591.08 | | 1616.11 | | 1634.88 | | 1650.53 | 110.62 |
| 1663.04 | | 1675.56 | | 1681.82 | 112.25 | 1691.2 | | 1703.72 | 110.74 |
| 1725.62 | | 1731.88 | | 1738.14 | | 1753.78 | 109.06 | 1810.1 | 108.94 |
| 1844.52 | | 1857.04 | | 1866.42 | | 1913.48 | | 1920.74 | 110.15 |
| 1929
2087.77 | | 1947.77
2151.15 | | 1994.71
2171.29 | 110.4 | 2013.48
2188.7 | | 2062.35
2211.22 | 110.34 |
| 2248.15 | | 2260.67 | | 2280.22 | | 2313.86 | | 2326.37 | 110.63 |
| 2357.66 | | 2370.18 | | 2410.85 | | 2516.23 | | 2570.69 | 110.52 |
| 2599.74 | | 2648.64 | | 2667.42 | 110.88 | 2676.8 | | 2686.19 | 113.95 |
| 2695.58 | | 2701.83 | | 2720.61 | | 2736.25 | | 2745.64 | 112.91 |
| 2758.15 | 112.71 | 2770.67 | 113.05 | 2786.31 | 112.78 | 2795.7 | 113.24 | 2836.38 | 112.41 |
| 2848.89 | 111.48 | 2867.67 | 111.23 | 2883.31 | 112.18 | 2892.7 | 112.48 | 2905.21 | 112.29 |
| 2926.53 | 112.36 | 2951.95 | 113.41 | 2974.05 | 113.96 | 2986.57 | | 2999.08 | 113.81 |
| 3008.47 | | 3024.11 | | 3042.89 | | 3074.18 | | 3083.56 | 113.14 |
| 3089.82 | | 3096.08 | | 3105.46 | | 3117.98 | | 3133.62 | 109.59 |
| 3191.59 | | 3202.48 | 109.3 | 3249.69
3373.14 | | 3271.47 | | 3289.63 | 107.19 |
| 3315.05
3460.29 | 108.44 | 3344.1
3490.32 | | 3549.77 | | 3427.74 | | 3440.26
3630.95 | 109.17 |
| 3645.47 | | 3699.96 | 108.73 | 3715.6 | | 3569.22
3809.47 | 107.93 | 3856.4 | 107.99 |
| 3900.21 | | 3912.72 | | 3934.63 | | 3947.14 | | 3956.53 | 111.83 |
| 3972.17 | | 3981.56 | | 3994.08 | | 4003.46 | | 4037.88 | 111.52 |
| 4053.53 | | 4097.33 | | 4125.49 | | 4138.01 | | 4178.68 | 111.41 |
| 4203.71 | 111.57 | 4213.1 | | 4228.75 | | 4278.81 | | 4285.07 | 111.64 |
| 4316.36 | 111.75 | 4322.62 | | 4344.53 | 111.79 | 4357.04 | | 4378.94 | 111.87 |
| 4400.85 | | 4454.04 | | 4466.55 | | 4475.94 | | 4488.46 | 111.85 |
| 4500.97 | | 4516.62 | | 4535.39 | | 4544.78 | | 4576.06 | 112.04 |
| 4585.45 | 111.69 | 4601.1 | | 4660.55 | | 4676.19 | | 4691.83 | 112.39 |
| 4734.77
4810.73 | | 4757.54
4832.65 | 112.46 | 4763.8 | | 4776.32 | 112.51 | 4785.7 | 112.83 |
| 4810.73 | | 4917.13 | 112.97 | 4842.03
4935.9 | | 4857.68
4945.29 | | 4863.94
4967.19 | 113.14
113.32 |
| 4982.83 | | 4992.22 | | 5001.61 | | 5014.12 | | 5020.38 | 113.32 |
| 5032.9 | | 5045.41 | | 5064.19 | 111.62 | 5076.7 | | 5095.48 | 112.04 |
| 5107.99 | | 5114.25 | | 5123.64 | | 5133.02 | | 5148.67 | 111.27 |
| 5158.05 | | 5164.31 | 111.43 | 5173.7 | | 5179.96 | | 5192.28 | 108.85 |
| 5210.43 | | 5224.95 | | 5243.11 | | 5279.42 | 107.62 | 5312.1 | 107.49 |
| 5322.99 | | 5377.46 | | 5406.51 | | 5428.29 | | 5439.18 | 107.51 |
| 5453.71 | | 5475.49 | | 5500.91 | | 5515.44 | | 5542.92 | 107.41 |
| 5552.31 | | 5567.95 | | 5577.34 | | 5580.47 | | 5586.72 | 113.5 |
| 5599.24 | | 5630.53 | | 5646.17 | 112.65 | 5678.83 | | 5693.36 | 112.44 |
| 5715.02 | 112.32 | 5744.19
5833.92 | | 5751.45 | | 5768.21 | 112.52 | 5791.4
5914.85 | 112.69 |
| 5808.89
5929.37 | 112.40 | 5962.2 | | 5849.56
5976.57 | | 5867.64
5990.36 | | 6018.52 | 112.55
113.93 |
| 6049.19 | | 6052.94 | | 6065.46 | | 6074.85 | | 6090.49 | 114.32 |
| 6115.52 | | 6140.55 | | 6171.85 | | 6200.01 | 114.21 | 6209.4 | 113.85 |
| 6237.56 | | 6275.11 | | 6281.36 | | 6293.88 | | 6309.52 | 114.39 |
| 6343.94 | | 6353.33 | | 6378.36 | | 6428.42 | | 6437.81 | 114.68 |
| 6447.2 | | 6462.84 | | 6503.52 | | 6525.42 | | 6541.06 | 114.16 |
| 6578.61 | | 6597.38 | | 6613.03 | | 6647.45 | | 6666.22 | 113.99 |
| 6700.65 | | 6750.71 | | 6771.76
6844.58 | | 6789.92 | | 6813.29 | 114.89 |
| 6828.93
6897.77 | | 6835.19
6938.79 | | 6972.86 | | 6857.09
6985.38 | | 6882.12
7054.22 | 110.62 |
| 7076.12 | | 7098.02 | | 7119.93 | | 7129.31 | | 7141.83 | 111.05 |
| 7160.61 | | 7179.38 | 111.02 | 7198.16 | 111.22 | 7207.54 | 111.85 | 7226.32 | 112.52 |
| 7235.7 | | 7251.35 | | 7263.86 | | 7292.02 | | 7326.44 | 107.76 |
| 7338.96 | | 7348.34 | 107.97 | 7370.25 | | 7379.63 | 108.42 | 7389.03 | 108.22 |
| 7410.92 | 108.23 | 7426.57 | 108.51 | 7432.82 | 108.92 | 7442.21 | 108.62 | 7451.6 | 108.92 |
| 7464.11 | 110.78 | 7473.5 | | 7483.741 | | | | 7506.51 | 113.54 |
| 7511.44 | | 7516.36 | | 7524.071 | | | | 7557.25 | 103.81 |
| 7585.66 | | 7601.61 | | 7619.07 | 99.47 | 7627.469 | | | 97.65 |
| 7657.05 | | 7693.67 | | 7710.21 | | 7736.79
7851.24 | 91.28 | 7762.61 | 88.87 |
| 7785.52
7884.31 | | 7801.95
7889.42 | 89.37 | 7812.9
7894.53 | | 7909.86 | | 7877.5
7916.111 | 93.45 |
| | 108.2441 | | 109.76 | 7924.1 | | 7944.93 | | 7953.86 | 114.94 |
| 7983.68 | | 7989.66 | | 8004.62 | | 8013.59 | | 8055.46 | 114.92 |
| 8064.44 | | 8079.39 | | 8088.36 | | 8100.32 | | 8114.22 | 114.27 |
| 8126.36 | 113.6 | 8138.48 | | 8184.07 | | 8215.34 | | 8235.56 | 111.75 |
| 8267.82 | 112.06 | 8280.05 | 111.97 | 8292.19 | 111.2 | 8333.62 | 110.58 | 8354.55 | 110.39 |
| 8393.3 | | 8425.67 | | 8462.23 | | 8494.43 | | 8551.06 | 110.29 |
| 8567.24 | | 8587.85 | | 8664.31 | | 8688.58 | | 8700.72 | 111.25 |
| 8720.95 | | 8733.07 | | 8761.39 | | 8785.25 | | 8797.21 | 110.77 |
| 8821.14 | | 8848.06 | | 8866.55 | | 8911.05 | 111.26 | 8967.7 | 111.64 |
| 8983.86
9105.28 | | 9003.58
9150.15 | | 9027.52
9165.87 | | 9060.41
9177.06 | | 9084.34
9203.98 | 112.07 |
| 9221.93 | | 9245.85 | | 9278.75 | 114.28 | 9293.7 | | 9305.67 | 118.25 |
| 9314.64 | | 9323.62 | | 9329.08 | | 9344.36 | | 9384.76 | 118.41 |
| 9398.95 | | 9410.96 | | 9424.06 | | 9444.81 | | 9498.31 | 118.16 |
| | | | | | | | | | |
| | | | | | | | | | |

```
Manning's n Values
Sta n Val Sta
0 .085 79.82
                                           n Val
                                                                      n Val
                                               .12 7812.9
                                                                        .025 8055.46
Bank Sta: Left Right Lengths: Left Channel Right 7501.59 7924.1 2073.72 1400 1374.03

Left Levee Station= 79.82 Elevation=134.0467

Right Levee Station=9323.616 Elevation=119.6467

Blocked Obstructions num= 1
                                                                                                  Coeff Contr.
                                                                                                                           Expan.
Right Levee Statten
Blocked Obstructions
 Sta L Sta R Elev
3069.42 3947.22 110.47
CROSS SECTION
RIVER: Rio Grande
                                           RS: 177.10*
REACH: Lower Reach
 Description: RGV-03,
 Station Elevation Data
                                          num=
                                                                                     Sta Elev
23.4 124.76
86.59 123.37
133.4 133.85
               Elev
121.45
                              Sta
7.02
                                          Elev
121.89
                                                         Sta
16.38
        Sta
0
                                                                        Elev
                                                                    123.19
                             44.47
112.34
185.24
     39.79
                                                                                   86.59
133.4
                                                                                                            93.61
143.77
                125.45
                                           122.72
                                                          49.15
                                                                      122.6
                                                                                                                         123.74
   102.98
157.22
                                                                                202.52
282.29
380.56
                130.03
                                           121.16
                                                        192.96
                                                                     119.02
                                                                                                 117.3
                                                                                                            212.88
                                                                                                                         116.88
    233.61
                 114.87
                              250.89
                                          112.78
110.01
                                                        270.38
362.69
                                                                     110.87
                                                                                              110.05
                                                                                                            293.32109.7514
    316.55
                              333.83
                                                                                               113.82
                 109.62
                                                                     111.84
                                                        422.25
532.43
    399.49
                 114.89
                             409.86
                                           114.73
                                                                     114.98
                                                                                  457.98
                                                                                               114.64
                                                                                                             478 97
   489.34
                                           114.59
                                                                                  544.34
                               499.7
                                                                     114.58
                                                                                               114.73
                                                                                                            568.82 114.64
                 114.91
                114.88
114.39
                             596.46
866.01
                                           114.43
114.53
                                                                     114.63
114.39
                                                                                  675.37
910.94
     586.1
                                                        663.45
                                                                                               114.48
                                                                                                            785.55
                                                        890.2
1007.7
                                                                     112.85 1035.67
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108.86 1204.67
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                                           109.97 1562.75
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112.32 1937.27
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  1885.43
                 112.24 2020.2
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                                           112.01 2044.4
112.39 2134.24
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112.11 2154.98
                                                                                               112.08 2078.95
112.06 2161.89
  1999 47
                                                                                               112.28 2327.76
112.45 2459.07
  2179.16
                 112.05 2208.94
                                           112 35 2227 55
                                                                     112.15 2248.28
                 112.28 2372.68
                                           112.19 2424.52
                                                                                               112.4 2604.99
113.38 2682.41
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                                           112.47 2578.18
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                113.31 2967.06
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  2953 39
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                                                                                                106.3 3212.42
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                                           108.24 3267.7
108.32 3331.58
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                 108.55 3426.67
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                                                                     108.25 3471.59
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  5368 44
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                                                                                               108 84 5430 98
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109.6 5541.54
                                           109.34 5475.88
109.32 5558.81
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  5531.17
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111.88 5958.07
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113 6225.76
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112.3 5877.66
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111.94 5904.38
                                                                     112.17 5830.02
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  5786.89
  5967.01
                111.95 5993.81
                                           112.08 6047.41
                                                                      112 2
                                                                                  6062 3
                 112.29 6184.39
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                                                                      112.62 6208.21
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                 112.73 6267.77
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                                                                                                                          112.78
                112.89 6395.09
113.78 6519.49
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                                           110.35 7089.68
                                                                                               110.27 7120.78
  7062.04
                 109.76 7082.77
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  7131.36 110.18 7144.98
7179.68114.0994 7196.81
                                           109.72 7151.89
114.19 7200.17
                                                                     110.15 7161.14
113.46 7206.89
                                                                                               111.49 7170.07
110.21 7215.15
  7218.25 107.433 7227.38 104.81 7234.84 7294.2 97.95 7316.8594.34486 7328.04 7403.97 88.71 7427.19 90 7442.66
                                                                     103.92 7254.24
92.7 7365.33
                                                                                               102.54 7272.12
89.61 7383.97
                  88.71 7427.19
91.85 7489.09
94.66 7550.78
                                                                                                 90.81 7473.62
92.26 7527.79
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                                                                      91.56 7504.57
95.73 7579.66
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  7543.56
                                                                                                 97.95 7592.16103.7533
                                                                     115.2 7614.43
114.44 7726.76
114.19 7793.77
112.57 7896.25
  7596.59105.8099 7597.43
7672.63 114.7 7680.75
                                           106.2 7599.78
114.35 7705.92
                                                                                               114.65 7653.69
114.08 7740.3
                114.76 7771.81
114.09 7870.64
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                                           115.35 7782.79
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                                           112.36 7954.81
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                                                                                               111.69 8024.35
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                 113.73 7932.85
                                                                     112.02 7989.29
                                                                                                                         111.52
  8167 11
                111.64 8181.74
113.06 8313.5
                                           111.49 8214.69
112.79 8320.83
                                                                     111.98 8269.59
                                                                                               112 22 8291 54
                                                                                                                         111 88
                                                                     112.93 8331.81
111.79 8397.69
                                                                                               111.94 8350.11
111.57 8412.33
                 112.03 8372.07
                                            111.7 8383.05
  8357.43
  8430.63
                 111.63 8452.59
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                                          112.11 8492.85
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                                                                                                112.63 8533.12
  8558.74
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                                                                                               114.81 8814.95
  8730.76
                 114.74 8752.73
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Printed at 13:42 on 03 Oct 2017
 8872.74 118.86 8877.1 117.78 8883.66 117.74
                                                                       8890.2
 8927.32 116.82 9016.85 116.39 9040.87
9108.56 116.04 9141.32 116.29 9158.79
                                                          116.93 9067.08
                                                                                 116.29 9093.28
Manning's n Values
                                   n Val Sta
.066 7227.38
                            Sta
      Sta n Val Sta
0 .154 6842.5
                                                           n Val Sta
.015 7592.16
                                                                                   n Val Sta
.066 7599.78
Bank Sta: Left Right Lengths: Left Channel Right
7196.81 7599.78 2073.72 1400 1374.03
Left Levee Station= 133.4 Elevation=133.8533
Right Levee Station=8866.184 Elevation=119.1933
                                                                                     Coeff Contr.
Blocked Obstructions
                                  num=
 Sta L Sta R Elev
4905.34 7154.33 111.33
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                    RS: 176.8
Description: RGV-03, Bathymetric elevations translated from IBWC 2008
                  Cross-sections
Station Elevation Data
  Sta
                                                              Elev
                                                                           Sta
                                                22.96
62.33
                                                          120.57
119.03
                                                                        32.8 122.72
68.89 118.72
                                                                                             45.93
121.37
                                                                                                        124.13
118.75
                                               157.46
                                                           127.87
                                                                        167.3
                                                                                  130.77
                                                                                             177.14
                                                206.66
                                                                                  127.82
                                                           130.63
                                                                        216.5
                                                                                             236.19
                                                262.43
344.44
429.73
                         252.59
324.76
                                    117.74
110.92
                                                                     282.11
360.84
                                                                                  115.42
110.79
  249.31
              118.23
                                                           117.51
                                                                                             298.51
                                                                      439.57
534.7
656.08
810.25
931.63
              112.31
115.04
115.35
                                                           114.22
115.24
114.8
   393.64
                         419.89
                                     112.95
                                                                                  114.61
                                                                                              449.41
                         515.02
626.55
711.84
905.38
                                                524.86
649.51
                                                                                  114.73
115.07
                                                                                             600.31
662.64
                                     114.86
   616.71
                                     114.72
              114.81
114.94
                                    114.69
114.69
                                                           114.87
115.16
   682.32
                                                784.01
                                                                                  114.71
                                                                                             866.02
   882.42
                                                925.07
                                                                                  114.99
 1016.92
               114.9 1030.04
                                     115.36 1049.72
                                                            114.93 1072.68
                                                                                      115 1079.24
              115.06 1118.61
                                     114.99 1138.29
                                                            115.38 1151.41
                                     114.5 1200.62
110.18 1230.14
109.51 1331.83
 1187.49
1217.02
1276.06
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107.38 1226.86
109.75 1289.19
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109.37 1384.31
                                                                                  106.87 1213.74
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 1459.76
1636.9
              109.52 1489.29
109.37 1679.54
                                     109.4 1541.77
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109.56 1745.15
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109.39 1843.56 114.05 1899.33

113.91 2020.7 114.17 2086.31 113.99 2174.88

113.79 2286.41 114.24 2394.66

114.18 2509.47 114.13 2647.25 109.33 2722.69

113.77 2804.7 112.87 2876.87

112.72 2955.6 112.41 3044.17 105.42 3109.78 108.48 3181.94

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114.16 6521.34 113 6613.19

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113.16 7606.27 113.59 7707.81

112 74 7825 73

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113.71 2033.82 113.75 2105.99 113.79 2194.56

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114.6 2660.37 109.9 2758.78

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109.19 3113.06 108.22 3198.34

108.79 3257.39 107.49 3408.29 108.16 4392.39

108.94 4533.45 110.37 4608.9 110.22 4690.9 109.85 4772.91

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105.59 5055.02 105.7 5123.91

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106 32 5356 82

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113.3 6255.63

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88.84 7032.42 91.64 7102.42

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6094.9

113.87

114.04

113 9

110.35

109 35

110.31

108.65

106.11

111 4

111.55

112.73

113 28

109.66 1827.16 113.22 1863.24

114.03 1978.05 113.76 2066.62 113.93 2128.95

114.11 2437.3 113.98 2598.04

113.07 2696.45

113.11 2844.07

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112.23 3070.41

108.32 3162.26

108.45 3218.03

108.18 3339.4 105.78 4326.79

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110.83 4625.3 110.75 4717.15

106.46 4851.64 106.73 4933.65

106.73 4933.65 106.25 5018.94 106.14 5074.71 105.58 5150.15 105.48 5245.28

106 43 5320 73

106.08 5399.46 107.13 5488.03

109.78 5566.76 110.31 5645.49

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96.64 7252.42

96.64 7252.42 114.16 7298.38 113.67 7403.2 116.35 7439.23 115.15 7517.84

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114.55

111 4789.32

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109.54

114.01 1882.93

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108.98 3240.99

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106.04 5337.13

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111.03 6865.78

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92.64 7132.42 93.64 7202.42

97.84 7262.42

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114.77 7449.05 114.71 7527.66

113.53 7593.17 113.51 7697.99

112.98 7796.25

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114.6 8179.48 114.8 8271.19

1837

1791 08

1958.37

2053.5 2112.55

2427 46

2588.2 2676.77

2830.95

2912.95 2998.24

3054 01

3208.19

4323.51

4402.23 4553.13

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4786.04

4923.81

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5993 21

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6268.75 6344.2

6442.61 6567.27

6659.12 6783.77

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6898.58 6920.42

7112.42

7242.42

7383.54

7432.68

7563.69

7753 67

7920.72

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 8598.73 114.75 8634.75
8710.09 114.38 8729.74
                                                         115.34 8687.16
114.07 8749.39
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114.43 8772.32
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                                   114.49 8742.84
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                                                         114.16 8929.54
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Manning's n Values num= 5
Sta n Val Sta n Val Sta
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                                   num=
                                                         n Val Sta
.015 7272.42
                                                                                 .066 7275.45
                                                                                                        .084

        Bank Sta: Left Right 6892.02
        Lengths: Left Channel Right 1153.45
        Right 2530
        2395.52

        Left Levee Station= Right Levee Station= 8408.75
        Elevation= 133.66

        Right Levee Station= 8408.75
        Elevation= 118.74

                                                                                 Coeff Contr.
                                                                                                       Expan.
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
Vel Head (ft)
                                                   Element
Wt. n-Val.
                                                                                       Left OB 0.153
                                     130.74
                                                                                                       Channel
                                                                                                                     Right OB
                                   0.68
130.06
                                                                                                        0.022
                                                    Reach Len. (ft)
Flow Area (sq ft)
                                                                                     1153.45
103562.70
                                                                                                                     2395.52
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                      2530.00
                              0.000159
                                                   Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
                                                                                     103562.70
                                                                                                      13648.76
                                                                                                                     24438.48
   Q Total (cfs)
                                   235000.00
                                                                                       78530.25
                                                                                                      123911.50
                                                                                                                      32558.25
  Top Width (ft)
Vel Total (ft/s)
                                                                                                                     1657.37
                                     8724.16
                                                                                       6683.36
                                                                                                       383.43
                                                                                       0.76
15.50
                                        1.66
                                                                                                         9 08
                                                                                                                        1 33
  Max Chl Dpth (ft)
                                        41.22
                                                                                                        35.60
  Conv. Total (cfs)
Length Wtd. (ft)
                                   18645210.0
                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                        6230695.0 9831303.0
                                                                                                                         2583215.0
                                                                                      0.15
                                                                                                                    1673.09
                                   2078.34
                                                                                                      398.84
                                                                                                       0.34
                                                   Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
                                       88.84
                                                                                                                         0.14
                                        15.95
                                                                                                          3.08
  Frctn Loss (ft)
                                                    Cum Volume (acre-ft)
                                                                                     235301.90
                                                                                                     81573.84
                                                                                                                     264309.10
                                         0.33
  C & E Loss (ft)
                                        0 13
                                                   Cum SA (acres)
                                                                                     25788.07
                                                                                                     3211.47
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 176.40* REACH: Lower Reach

INPUT

| INPUT | | | | | | | | | |
|-----------|----------|----------|--------|---------|--------|----------|---------|----------|--------|
| Descripti | | | | | | | | | |
| Station E | levation | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 122.02 | 6.85 | 122.42 | 15.98 | 123.64 | 22.82 | 125.16 | 31.96 | 126.21 |
| 38.81 | 125.73 | 43.37 | 122.96 | 47.94 | 122.81 | 84.46 | 123.14 | 91.3 | 123.43 |
| 100.44 | 127.86 | 109.57 | 129.43 | 123.27 | 133.03 | 130.11 | 133.45 | 137.3 | 133.04 |
| 151.68 | 129.55 | 166.06 | 125.4 | 175.65 | 123.15 | 185.23 | 122.55 | 199.61 | 120.84 |
| 211.59 | 118.9 | 230.76 | 117.14 | 245.14 | 116.46 | 269.1 | 116.08 | 281.08 | 116.34 |
| | | | | | | 367.53 | | | |
| 300.26 | 116.13 | 307.45 | 116.76 | 338.59 | 116.33 | | 115.32 | 376.94 | 115.49 |
| 384.13 | 115.08 | 444.04 | 114.73 | 451.23 | 114.18 | 492.47 | 113.88 | 529.96 | 113.34 |
| 566.25 | 113.33 | 585.42 | 113.17 | 626.16 | 113.21 | 638.14 | 113.37 | 654.91 | 113.22 |
| 674.09 | 113.45 | 700.45 | 113.54 | 736.4 | 113.42 | 745.98 | 113.73 | 760.36 | 113.44 |
| 781.92 | 113.35 | 810.68 | 113.48 | 825.06 | 113.75 | 834.64 | 113.59 | 849.02 | 114.03 |
| 861 | 113.7 | 863.4 | 113.22 | 870.59 | 108.91 | 872.99 | 108.15 | 882.57 | 108.5 |
| 889.76 | 110.38 | 911.33 | 109.93 | 925.7 | 110.15 | 935.29 | 110 | 967.29 | 109.96 |
| 1004.78 | 110.51 | 1042.27 | 111.68 | 1067.25 | 111.99 | 1138.98 | 111.54 | 1251.61 | 111.72 |
| 1268.38 | | 1301.93 | | 1335.48 | | 1340.27 | | 1345.06 | 114.35 |
| 1354.65 | | 1381.01 | | 1416.95 | | 1424.14 | | 1438.52 | 114.71 |
| 1455.3 | | 1469.67 | | 1493.63 | | 1503.22 | 115.07 | 1517.6 | 114.77 |
| 1536.77 | | 1548.75 | | 1567.92 | 114.93 | 1582.3 | | 1596.68 | 114.98 |
| | | | | | | | | | |
| 1613.45 | 114.87 | 1651.8 | | 1663.78 | | 1718.89 | | 1738.06 | 115.16 |
| 1742.85 | 114.98 | 1774 | | 1793.18 | | 1826.73 | | 1884.24 | 114.98 |
| 1891.43 | | 1915.39 | | 1927.38 | | 1936.96 | | 1948.94 | 114.37 |
| 1963.32 | 111.81 | 1975.3 | | 1982.49 | | 2008.85 | | 2032.81 | 114.84 |
| 2042.39 | 114.58 | 2051.98 | 114.88 | 2061.57 | 114.4 | 2095.12 | 114.22 | 2114.28 | 113.74 |
| 2140.65 | 114.15 | 2171.8 | 113.94 | 2183.78 | 114.04 | 2190.97 | 113.51 | 2222.12 | 114.19 |
| 2236.5 | 111.15 | 2248.48 | 109.3 | 2265.26 | 111.81 | 2284.43 | 111.24 | 2303.6 | 111.06 |
| 2317.97 | 111.17 | 2361.11 | 111.97 | 2373.09 | 111.32 | 2413.83 | 111.16 | 2433 | 110.95 |
| 2444.98 | 111.03 | 2473.74 | 110.71 | 2483.33 | 109.57 | 2879.06 | 109.66 | 3066.47 | 109.93 |
| 3091.45 | 109.81 | 3154.3 | | 3166.28 | | 3192.64 | | 3202.23 | 111.62 |
| 3209.41 | | 3228.59 | | 3269.32 | 112 | 3286.1 | | 3319.65 | 112.49 |
| 3331.63 | | 3338.82 | 112.68 | 3348.4 | | 3367.58 | | 3389.14 | 113.26 |
| 3405.91 | | 3429.88 | | 3439.47 | 113.12 | 3456.24 | | 3468.22 | 112.82 |
| | | | | | | | | | |
| 3480.2 | | 3489.79 | | 3504.17 | | 3516.15 | | 3525.73 | 110.55 |
| 3537.71 | | 3561.68 | | 3583.25 | | 3590.43 | | 3626.38 | 110.32 |
| 3645.55 | | 3659.93 | | 3667.12 | 110.42 | 3676.7 | | 3691.08 | 110.22 |
| 3700.67 | | 3707.86 | | 3717.44 | | 3736.61 | | 3755.78 | 109.75 |
| 3762.97 | | 3794.12 | | 3820.48 | 109.7 | | | 3834.86 | 109.57 |
| 3858.83 | 109.7 | 3873.2 | 110.31 | 3892.37 | 109.96 | 3899.57 | 110.24 | 3906.75 | 109.93 |
| 3918.74 | 110.08 | 3937.9 | 109.83 | 3949.88 | 110.21 | 3981.04 | 110.13 | 3990.62 | 110.67 |
| 4002.61 | 110.79 | 4021.77 | 111.32 | 4043.35 | 112.75 | 4050.53 | 112.34 | 4060.12 | 112.63 |
| 4069.7 | | 4079.29 | | 4098.46 | 112.67 | 4139.2 | | 4223.07 | 112.54 |
| 4244.64 | | 4254.22 | | 4287.77 | | 4323.72 | | 4354.87 | 113.26 |
| 4371.65 | | 4388.42 | | 4412.38 | | 4426.76 | | 4457.91 | 112.73 |
| 4472.29 | | 4489.06 | | 4498.65 | | 4520.22 | | 4546.58 | 112.51 |
| 4558.56 | | 4563.35 | | 4582.52 | | 4608.88 | | 4618.47 | 111.72 |
| | | | | | | | | | |
| 4628.05 | | 4656.81 | | 4673.58 | | 4699.94 | 113.3 | 4726.3 | 113.49 |
| 4757.45 | | 4781.42 | | 4791.01 | | 4807.78 | | 4848.52 | 111.9 |
| 4858.1 | | 4872.48 | | 4886.86 | | 4918.01 | | 4934.79 | 111.56 |
| 4949.16 | | 4953.95 | | 4970.73 | | 4975.52 | | 4997.09 | 111.31 |
| 5009.07 | | 5016.27 | | 5028.24 | | 5037.25 | | 5046.25 | 106.24 |
| 5049.961 | .05.0611 | 5056.24 | 104.06 | 5083.7 | | 5096.579 | 9.23254 | 5110.97 | 95.55 |
| 5124.88 | 92.83 | 5152.33 | 90.17 | 5166.06 | 89.36 | 5186.06 | 89.36 | 5195.95 | 89.96 |
| 5215.75 | 90.72 | 5235.55 | 90.91 | 5245.45 | 91.49 | 5275.14 | 91.68 | 5285.04 | 92.22 |
| 5294.94 | 92.26 | 5304.83 | 91.77 | 5314.73 | 92.35 | 5344.43 | 92.39 | 5354.33 | 92.89 |
| 5364.22 | | 5374.12 | | 5391.28 | | 5402.51 | | 5406.829 | |
| 5410.68 | | 5433.283 | | | | 5464.08 | | 5471.33 | 112.22 |
| 5485.85 | | 5509.06 | | 5522.12 | | 5529.37 | | 5549.69 | 113.41 |
| 5561.3 | | 5588.87 | | 5603.38 | | 5710.93 | | 5750.24 | 113.41 |
| 5760.43 | | 5776.44 | | 5831.03 | | 5848.56 | | 5884.18 | 113.24 |
| | | | | | | | | | |
| 5901.15 | | 5953.77 | | 5981.73 | | 5987.55 | | 6002.11 | 112.17 |
| 6025.4 | 112.25 | 6045.79 | 112./8 | 6053.07 | 114.07 | 6064.71 | 113.96 | 6085.27 | 113.36 |
| | | | | | | | | | |

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6111.55 112.22 6140.42
                                                                     113.02 6159.34
  6191.37
                114.42 6207.98
112.75 6339.87
                                           114.67 6234.29
112.64 6382.09
                                                                      113.12 6272.9 112.96 6291.83
112.65 6421.4 112.33 6456.35
                                                                                                                           112.68
                                                                     112.65 6533.51
112.47 6683.46
  6475.27
                 112.75 6486.92
                                             113.2 6497.11
                                                                                                112.85
                                                                                                              6569.9
  6594.66
                 112.49 6649.98
                                           112.28 6671.81
                                                                                                112.81 6686.37
  6698.02
                 113.29 6708.21
                                           112.99 6728.59
                                                                      113.89 6738.79
                                                                                                113.74 6746.07
                112.74 6778.09
112.86 6880.01
                                           112.97 6807.21
113.09 6916.4
                                                                      113.07 6823.23
113.24 6930.96
                                                                                                112.91 6847.98
113.09 6945.52
                                           113.09 0910.4
113.2 6996.48
114.17 7083.83
  6961.54
                113.94 6965.9
113.73 7069.27
                                                                      113.56
                                                                                  7002.3
                                                                                                113.83 7021.23
113.91 7102.76
                                                                      113.91 7098.39
                                           114.68 7136.25
113.01 7200.3
112.57 7249.8
                                                                                                114.35 7152.26
112.76 7217.77
112.66 7283.29
                                                                      115.27 7144.98
  7118.77
                 115.24 7127.51
                                                                                                                           114.54
                                                                     115.27 7144.98
112.69 7210.49
113.09 7261.45
112.35 7321.14
109.97 7372.1
                114.23 7185.75
112.61 7238.16
  7229.42
  7289.09112.6108 7300.76
                                           112.79 7313.86
112.97 7356.08
                                                                                                112.74 7326.96
110.22 7392.48
  7337.16 113.08 7341.52
                                                                                                                             110.2
                                                                     109.97 7372.1
113.21 7433.25
113 7514.77
113.12 7587.57
113.15 7645.8
113.88 7807.41
                112.29 7414.32
112.29 7482.75
113.02 7565.73
113.24 7629.79
113.62 7738.98
                                           112.69 7418.69
113.18 7488.57
113.29 7578.83
   7398.3
                                                                                                112.05 7436.16
112.98 7542.44
  7453.63
  7561.36
7612.32
7705.5
                                                                                                113.94 7602.13
112.9 7670.56
113.86 7827.79
                                                                                                                             113.1
                                           112.67 7641.44
114.11 7760.82
                                                                                                                           114.03
  7849.63
7950.08
                113.66 7886.02
113.26 7957.36
                                           113.59 7920.96
112.91 7963.19
                                                                     113.06 7934.07
113.2 7974.84
                                                                                                113.16 7938.44
112.72 7983.57
                                                                                                                           113.42
                112.4 8001.04
113.68 8092.76
                                           112.79 8006.86
113.15 8111.69
                                                                      113.51 8047.63
113.27 8127.89
                                                                                                113.38 8050.54
112.56 8137.89
  7990.85
                113.61 8185.94
113.09 8276.21
114.9 8379.58
                                           114 8215.06
113.67 8283.48
  8149.54
                                                                      113.25 8248.54
                                                                                                113.79 8260.19
                                                                                                                           112.99
                                           114.61 8395.6
116.56 8466.9
116.08 8515.22
                                                                                                116.08
  8347.07
                                                                      115.18 8411.61
                                                                                                              8421.8
                                                                      118.92 8479.53
116.06 8531.44
115.12 8651.48
  8430.54
8495.75
                116.11
                116.11 8455.3
116.79 8505.48
                                                                                                118.15 8486.01
                                                                                                  115.4 8554.14
                                                                                                                           115.48
                                          115.07 8628.77
115.39 8745.57
  8560 63
                115.33 8596.32
                                                                                                115.27 8657.97
  8693.65 114.81 8729.34
                                                                      115.04
                                                                                   8755.3
                                                                                                115.13 8768.28
                                                                                                                           114.76
                                          114.74 8809.21
115.24 8935.67
  8787.74 114.97 8800.72
                                                                      114.98 8829.92
                                                                                                114.57 8872.44
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .154 5028.24 .066 5096.57
                                                                    n Val Sta
.015 5410.68
                                                                                                 n Val Sta
.066 5436.51
Bank Sta: Left Right Lengths: Left Channel Right 5028.24 5436.51 1153.45 2530 2395.52
                                                                                                  Coeff Contr. Expan.
5028.24 5436.51 1153.45 2530 2395.52

Left Levee Station=130.1133 Elevation=133.4533

Right Levee Station=8467.616 Elevation= 119.01
Blocked Obstructions num=
Sta L Sta R Elev Sta L
 Sta L Sta R Elev Sta L Sta R Elev 1927.71 5014.34 112.9 5436.51 8988.9113.7933
CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 176.00*

Description: RGV-03 Station Elevation Data num= 460 Elev 125.6 Sta 8.99 Sta 17.99 Elev 128.18 133.04 126.71 21.85 77.78 160.96 24.42 101.98 180.62 126.88 0 128.3 51 4 127.76 127.59 56.54 130.72 130.09 69.39 145.84 132.95 128.06 108.03 124.04 120.86 119.29 113.52 204.82 117.63 112.95 185.16 223.08 115 77 254.63 114 9 271 36 325.59 517.88 111.94 365.01 111.6 461.92 112.1 484.6 111.91 112.06 526.95 112.31 536.03 109.43 548.12 664.68 109.63 114.51 552.66 709.94 601.59 781.02 110.54 113.88 648.91 113.71 790.85 814.51 909.57 836.98 968.55 840 980.65 115.49 115.87 115.76 862.69 116 1143.98 114.26 114.04 846.05 1041.14 115.83 115.73 115.67 1230.18 115.36 1342.1 114.39 1258.92 115.57 1369.32 1213.55 116.11 1221.11 114.77 1274.04 115.6 1325.46 115.53 1373.85 1313.36 113.17 1420.74 1393.52 115.61 1410.15 114.44 1444.94 114.07 1481.23 114.54 114.22 1534.16 114.07 1942.15 114.09 1552.31 113.85 1981.82 113.93 1558.36 113.77 1989.38 113.37 1808.11 114.44 2012.06 1926.39 2028.7 2155.73 114.72 2076.22 116.01 2179.93 115.28 2091.98 115.8 2193.54 115.79 2116.41 116.17 2202.62 115.9 2140.61 115.97 2216.23 114.63 114.69 2279.75 114.27 2411.32 114.48 2291.84 113.82 2426.44 114.62 2311.5 113.89 2435.51 114.12 2331.17 114.2 2447.61 114.44 2542.89 2257 06 2365.95 2476 35 113.95 2483.91 114.12 2503.57 113 97 2529 28 115 12 114.86 2669.93 113.87 2824.18 114.91 2719.84 113.19 2843.85 114.66 2739.49 113.12 2860.48 114.85 2770.16 112.42 2883.17 2804.53 2911.9 3051.04 111.61 2930.05 111.41 3105.48 112.44 2973.91 111.58 3128.16 112.34 2993.57 111.92 3144.8 111.8 3025.33 111.48 111.58 3156.93112.4118 112.53 3167.15 112.07 3177.96 103.84 3236.95102.2132 3242.46 107.51 3187.5105.3757 3200.07 104.09 101.61 3257.29 97.91 3269.88 95.39 90.49 3339.69 89.87 3349.69 89.87 3164.46 3213.61 02.2132 3242.46 101.61 3257.29 91.86 3322.24 90.49 3339.69 90.97 3423.46 91.61 3437.86 92.08 3506.43 91.94 3526.03 94.82 3566.0895.80383 3572 112.62 3623.53 112.13 3642.41 3287 33 92 83 3296 84 90.8 3398.67 91.7 3479.04 3467.25 92.26 3535.82 92.96 3563.92 112.85 3618.81 3552.8 96.01 3594.15107.1731 111.93 3654.21 3597.57 3666 110.15 3677.81 112.23 3748.6 109.36 3689.6 112.67 3781.64 109.43 3701.41 112.42 3786.36 108.55 3715.57 112.59 3800.52 3736.81 112.19 3868.96 112.32 4065.19 112.93 4164.64 112.15 3963.38 112.55 4107.82 112.11 4003.63 112.73 4124.39 3845 36 111.95 3897.27 112.6 4086.5 113.17 4197.79 113.19 4264.09 111.27 4451.15 109.44 4517.45 4150.43 113.35 4219.1 113.4 4290.14 112.64 4351.7 111.01 4493.77 111.25 4439.31 109.56 4512.71 112.63 4306.71 4467.72 111.31 4484.3 111.31 4484.3 109.14 4543.49 112.89 4619.26 111.05 4742.39 114.2 4825.26 109.44 4517.45 109.38 4588.48 112.07 4668.99 114.27 4777.91 113.85 4860.78 4538.75 109.56 4555.33 112.74 4633.47 109.12 4569.54 112.26 4650.04 110.27 4600.32 111.46 4761.33 113.57 4839.47 4695.04 111.95 4773.17 114.52 113.56 4846.57 4903.4 112.6 4915.24 112.73 4957.86 112.65 4981.54 112.43 4988.65 112.18 112.29 5066.78 112.14 5170.97 112.15 5088.09 112.2 5199.38 112.49 5102.29 111.91 5213.58 112.2 5135.45 112.07 5256.21 5149.65 112.07 5353.29 111.75 5606.64 5286.98 5381.7 112.49 5305.93 112.17 5440.9 113.28 5315.4 112.18 5481.15 113.14 5322.5 111.79 5571.13 112.7 5630.32 114.2 5698.99 113.84 5649.27 115.12 5710.83 113.96 5665.84 114.6 5715.56 5613.75 112.84 5620.85 113.36 5727 4 113.12 5746.35 112.69 5779.49 113.04 5793.7 112.77 5919.2 113 5826 85 113 23 113.04 5893.15 113.13 5907.36 112.87 6051.8 5952.35 112.87 5973.65 113.11 6004.44 113.12 6028.12 114.27 6084.94 113.45 6144.14 112.78 6099.15 114 6151.25 113.17 6110.99 113.46 6160.72 113.14 6122.83 113.82 6174.92 113.83 6210.44 113.76 6231.75 114.56 6253.06 114.94 6257.8 114.64 114.58 6286.21 115.12 6300.42 114.37 6307.52 115.29 6321.73 115.82 6198.6 6276.73

```
6333.57 115.69 6340.67
6376.18 114.27 6383.29
                                                                      114.64 6361.98
                                           113.94 6388.02
112.32 6473.26
                                                                       114.6 6395.13
112.7 6482.74
                                                                                                113.91 6409.34
112.53 6494.58
   6438.4112.8179 6466.16
  6513.52 112.36 6518.26
                                           112.9 6527.73
113.13 6610.6
                                                                      112.24 6546.67
                                                                                                 113.11 6565.61
                                                                                                                             112.4
                                                                      112.69 6629.54
111.54 6679.27
  6582.19
                112.55 6601.13
                                                                                                 112.99 6646.12
                                           112.88 6672.16
                112.05 6662.69
  6650.86
                                                                                                112.04 6688.74
                113.54 6705.31
107.9 6755.03
                                           111.55 6712.42
107.62 6771.61
                                                                      108.96 6719.52
107.61 6778.71
                                                                                                107.53 6738.47
107.96 6788.19
  6745.57
  6792.92
                112.91 6800.03
111.63 6849.75
                                           112.55 6814.23
113.2 6878.16
                                                                      113.04 6821.34
112.92 6885.27
                                                                                                114.07 6840.28
113.13 6925.52
                112.93 6963.4
113.39 7032.08
112.88 7088.9
112.82 7145.73
112 7202.56
                                           113.04 6977.61
112.87 7039.18
114.03 7096
                                                                      112.8 7001.29
113.21 7053.38
114.45 7107.84
                                                                                                113.25 7008.4
112.74 7060.48
113.22 7119.68
  6934.99
   7022.6
7081.8
                                           112.27 7152.83
112.56 7212.03
  7136.26
7190.72
                                                                      112.35 7164.67
112.41 7230.97
                                                                                                111.52 7183.61
112.94 7247.54
                112 7202.56
113.11 7287.8
113.06 7410.93
113.57 7474.85
112.73 7581.41
112.07 7666.65
                                                                     112.41 7230.97
113.13 7323.32
113.14 7446.44
113.6 7508.01
112.25 7619.3
111.25 7735.31
111.31 7777.94
  7283.06
7377.77
7467.75
                                           112.85 7299.64
113.29 7429.87
113.08 7486.69
                                                                                                112.98 7356.46
113.32 7453.54
                                                                                                                           113.49
                                                                                                113.54 7522.21
112.29 7638.23
111.67 7697.43
                                           112.86 7609.82
111.52 7685.59
  7659.54
                112.19 7714.01
110.81 7751.89
                                           111.24 7725.85
110.58 7768.46
                                                                                                112.69 7740.05
112.73 7787.41
   7706.9
  7747.15
                                                                                                                             113.1
                                           112.3 7818.19
112.48 7898.7
111.32 7974.78
111.97 8047.87
110.97 8140.21
                112.48 7813.46
111.83 7875.02
  7794.51
7867.91
                                                                      112.62 7844.23
111.97 7917.64
                                                                                                112.17 7848.97
111.23 7941.31
                111.72 7953.15
111.64 8024.19
                                                                      110.82 7991.04
  7948.42
                                                                                                110.67 8002.88
                                                                                                                           110.88
 8009.99
8107.07
                                                                                                112.3 8088.12
111.79 8161.52
                111.04 8116.54
112.34 8178.1
112.08 8239.66
                                                                      111.48 8144.95
                                                                                                                           111.78
                                           111.36 8189.94
112.71 8249.13
113.9 8410.16
114.13 8467
  8171
8227.82
                                                                      110.78 8206.52
113.76 8291.76
                                                                                                111.03 8215.99
113.75 8334.39
                113.39 8398.32
113.47 8457.52
  8384 12
                                                                      113 61 8436 21
                                                                                                  114.4 8445.68
                                                                      114.19 8490.68
                                                                                                   114.9 8507.26
                                                                                                                            115.04
                                          114.13 8467
119.27 8537.42
115.7 8662.67
115.44 8834.05
115.43 8919.75
                                                                     118.19 8490.68
118.19 8546.9
115.17 8710.78
115.14 8847.24
115.24 8929.63
116.39 9018.62
  8526.12
                 119.24 8530.83
                                                                                                117.33 8566.18
                                                                                                115.5 8735.18
115.47 8867.01
                115.14 8787.9
115.11 8909.85
  8764.84
                                                                                                                           115.56
                                                                                                115.64 8942.82 115.39
115.97 9044.99 116.05
  8962.59 115.45 8979.07
                                          116.33 8992.26
Manning's n Values
                                Sta n Val Sta
64.46 .025 3398.67
       Sta n Val Sta
0 .066 3164.46
                                                                       n Val
                                                                                        Sta
                                                                                                   n Val
                                                                         .066 5826.85
Bank Sta: Left Right 3164.46 3597.57
                                           Lengths: Left Channel
                                           1153.45
2
                                                                       2530 2395.52
Ineffective Flow num= 2
Sta L Sta R Elev Permanent 0 3164.46 112.53
3597.57 9044.99 112.85 T
                                                          Elevation= 133.04
Elevation= 119.28
Left Levee Station= 77.76
Right Levee Station=8526.483
Blocked Obstructions num=
 Sta L Sta R Elev
3597.57 9044.99112.3967
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                           RS: 175.6
TNPIIT
Description: RGV-03, Bathymetric elevations translated from IBWC 2008
                     Cross-sections
Station Elevation Data
                                         num=
                  Elev Suc
129.17 6.55
     Sta Elev
0 129.17
58.97 123.22
                                                             Sta
                                                                         Elev
                                              Elev
                                          131.14
116.22
                                                       16.38
91.74
167.09
                                                                    133.04
114.92
                                                                                  29.49
101.56
                                                                                               132.97
112.91
                                                                                                              42.59 129.64
111.39 112.02
   121.22
245.72
                110.53 137.6
112.6 255.55
                                           110.05
116.28
                                                                     110.48
117.02
116.75
                                                                                  196.58
278.48
                                                                                                110.46
115.88
                                                                                                              235.89
                                                          262.1
                                                                                                              314.52
                             376.77
                                                          386.6
   324.35
                116.56
                                           116.86
                                                                                   416.09
                                                                                                116.99
                                                                                                              527.48
812.51
                                                                                                                            116.97
                117.17
118.23
                                           117.43
118.81
                                                                                   792.85
887.87
                              737.16
                                                          786.3
                                                                      118.22
                 118.23 855.1
118.36 969.77
117.09 1113.93
                                                        868.21
                                                                      118.33
   848.55
                                                                                                 118.78
                                                                                                              940.29
                                                                      118.08 1015.64
116.23 1149.97
   946.84
                                           118.45
                                                         986.15
                                                                                                 118.08 1038.57
                                            116.6 1136.86
  1100.82
                                                                                                 115.14 1176.18
                111.54 1205.66
111.95 1303.95
                                           111.48 1238.43
111.39 1317.06
                                                                      110.87 1251.53
105.37 1320.33
                                                                                                110.87 1281.02
104.85 1340.33
  1189.28
  1300.68
                                                                                                  97.89 1428.33
90.39 1531.33
91.79 1677.33
  1360 33
                  104 3 1377 33
                                           103.45 1395.33
                                                                      102.19 1413.33
                  93.06 1461.33
91.09 1586.33
91.69 1714.33
95.28 1758.63
                                                                      91.1 1513.33
91.29 1641.33
93.97 1728.33
111.52 1794.59
                                            91.69 1478.33
91.59 1604.33
  1567.33
                                           91.69 1725.33
111.68 1788.05
                                                                                                95.88 1731.33
110.83 1814.2
  1695.33
  1733.33
                                           109.41 1837.08
106.55 1902.46
                                                                      108.31 1853.42
105.6 1922.07
  1820.74
                  110.7 1827.27
                                                                                                 108.11 1869.77
                                                                                                                            106.88
                 106.95 1895.92
                                                                                                   106.1 1951.49
  1886.11
                                                                     111.68 2039.74
111.15 2265.32
112.05 2435.87
112.77 2501.47
112.65 2590.02
                                                                                                110.59 2069.16
111.15 2307.96
111.97 2458.83
                                           111.42 2020.13
  1967 83
                 111.79 2013.59
                                                                                                                            110 75
                                           110.81 2173.76
111.57 2406.35
  2321.08
                 111.48 2376.84
                                                                                                                            112.43
                112.22 2488.35
112.49 2544.1
                                           113.18 2494.91
112.78 2580.18
                                                                                                113.22 2508.03
112.8 2619.54
  2465.39
  2524.42
                112.49 2544.1
112.22 2681.85
110.71 2803.2
  2652.33
                                           111.95 2717.93
109.8 2839.28
                                                                      111 2740.89
109.57 2855.68
                                                                                                111.47 2754.01
109.66 2875.36
                                                                                                108.6 2986.87
105.73 3062.3
107.48 3131.18
                                           108.86 2963.91
106.64 3026.23
                                                                      109.27 2980.31
106.46 3032.79
  2924 55
                  109.2 2940.95
                                                                                                                            108 82
                 108.16 2999.99
                                                                      106.39 3121.34
111.53 3193.49
110.2 3344.36
                 106.65 3085.26
  3068.86
                                           105.99 3104.94
                 108.94 3147.58
110.2 3278.77
                                           111.71 3173.81
109.87 3314.84
                                                                                                110.89 3216.45
110.29 3354.2
  3137.74
                                                                                                             3354.2
  3242.69
                                                                                                                            110.77
  3364.04
3459.15
                110.49 3370.6
112.72 3478.83
                                           110.89 3387
112.64 3488.67
                                                                      114.24 3393.56
113.05 3508.35
                                                                                                114.55 3432.92
112.97 3518.19
                                                                                                                            113.77
                                           112.16 3583.78
112.06 3685.46
                                                                                               112.31 3623.14
111.9 3714.97
  3528.03
                 112.63 3567.39
                                                                      112.38 3616.58
                                                                                                                           112.11
                 112.35 3675.62
                                                                      111.69
                                                                                   3695.3
  3642.82
  3757.61
                111.83 3793.69
111.76 3938
112.23 4111.82
                                           111.66 3823.21
                                                                      112.19 3842.88
                                                                                                111.78
                                                                                                              3888.8
                                           111.88 3977.35
113 4124.94
                                                                      111.49 3997.03
113.35 4138.06
                                                                                                111.73 4056.07
113.11 4147.9
   4098.7
                                           111.49 4279.09
111.27 4492.28
                                                                                                111.5 4367.65
112.09 4551.31
  4190.54
4426.68
                111.3 4229.9
111.12 4446.36
                                                                      111.42 4311.89
111.22 4541.47
                                           113.16 4574.27
114.99 4669.38
                                                                      114.44 4600.51
116.35 4685.78
  4561.15
                 112.73 4567.71
                                                                                                 114.63 4623.47
                                                                                                                           113.74
                 114.85 4652.98
  4708 74
                113.31 4734.98
                                           112 63 4751 38
                                                                      112 64 4780 89
                                                                                                 113.11 4800.57
                                                                                                                           113 03
                                           113.16 4895.69
112.96 5020.32
                                                                       113.34 4938.32
                                                                                                 113.02 5072.79
                 112.93 5010.48
                                                                      112.71 5049.83
  5092.47
                113 5125.27
112.36 5223.66
                                           112.66 5144.95
112.93 5240.06
                                                                      112.97 5158.07 112.89 5194.14
112.89 5256.46 113.54 5272.86
  5203.98
```

114.16 5295.82 113.35 5308.94 113.89 5328.61 113.48 5361.41 113.89 113.8 5394.21 114.31 5407.33 115.06 5436.85 115.71 5443.41 115.28

```
114.83 5512.28 116.06 5531.96
 5548.36
                116.13 5558.2
                                        114.58 5568.04
114.19 5617.23
                                                                  114.59 5577.88
113.68 5623.79
                                                                                            115.9 5587.72
                                                                                                                     116.65
 5653.31
               113.65 5699.23
                                         112.31 5718.91
                                                                  112.39 5732.02
                                                                                            111.96 5741.86
 5754.98
                 112.3 5761.54
                                         113.34 5771.38
                                                                  113.65 5791.06
                                                                                            112.78 5797.62
                                        111.91 5843.54
113.07 5909.13
113.18 5981.29
 5804.18
                112.92 5817.3
                                                                  113.14 5859.93
                                                                                            112.74 5869.77
               112.45 5902.57
113.2 5958.33
                                                                  112.84 5918.97
112.52 5987.85
                                                                                           113.42 5932.09
111.74 6004.24
 5945.21
                                        111.81 6040.32
105.09 6109.2
105.72 6171.51
113.39 6223.99
113.55 6269.9
 6017.36
               111.04 6027.2
107.25 6082.96
                                                                  114.34 6050.16
105.15 6119.04
                                                                                           114.11 6063.28
105.57 6132.15
               105.16 6164.95
112.67 6214.15
111.21 6263.35
113.27 6368.3
113 6460.13
                                                                                           112.24 6184.63 113.22
113.75 6250.23 112.39
113.01 6312.54 113.3
113 6440.45 112.62
113.03 6502.77 113.47
                                                                  109.54 6178.07
 6155.11
                                                                  109.54 6178.07
114.93 6233.83
113.66 6302.7
112.86 6420.77
113.27 6483.09
 6256.79
                                        113.41 6381.42
112.82 6473.25
 6348.62
 6450.29
               112.68 6525.73
114.35 6604.44
 6515.89
                                        113.19 6545.4
114.95 6620.84
                                                                  112.47 6555.24
113.08 6630.68
                                                                                           113.26 6584.76
112.95 6637.24
                                                                 111.65 6699.55 110.38 6706.11
111.16 6752.03 111.95 6765.15
112.41 6853.7 112.14 6863.54
112.1 6919.3 112.06 6945.54
112.25 7014.41 112.56 7040.65
                                        111.55 6683.15
111.84 6735.63
112.2 6843.86
               112.4 6673.31
111.13 6725.79
   6660.2
                                                                                                                     111.02
 6715.95
6791.39
               112.52 6814.34
112.07 6886.5
112.4 6965.21
 6870.1
6955.37
                                        112.43 6896.34
112.84 6994.73
                                                                 112.25 7014.41

112.38 7106.24

113.13 7194.8

111.21 7329.27

110.74 7414.54

111.19 7460.46

109.11 7512.93

111.56 7598.21
               112.43 7089.84
112.35 7145.6
111.94 7276.79
                                        112.68 7099.68
113.17 7175.12
                                                                                           112.94 7119.36
112.42 7214.47
 7066.89
                                        112.13 7316.15
110.16 7407.98
110.3 7450.62
111.87 7506.37
112.49 7571.97
                                                                                           111.28 7355.5
110.55 7421.1
                                                                                                                     110.61
 7263.67
               110.97 7394.86
                                                                                           109.76 7476.86
108.76 7535.89
111.26 7604.77
               110.4 7437.5
111.95 7496.53
111.96 7562.13
 7427.66
                                                                                                                     109.79
 7489.97
7549.01
               110.97 7647.4
109.71 7742.52
                                        110.12 7673.64
109.31 7775.31
 7640 84
                                                                  110.33 7683.48
                                                                                           111.29 7716.28
                                                                                                                     110 47
                                                                   109.6 7785.15
                                                                                           110.17 7791.71
  7726.12
                                                                  109.6 7785.15
108.55 7870.43
110.59 7978.66
110.02 8080.33
108.59 8142.65
113.12 8221.36
113.44 8349.29
                                         108.5 7860.59
110.45 7952.42
 7827.79
                108.96 7844.19
                                                                                           109.68 7890.1
                                                                                                                     110.15
                                         109.55 8057.37
                                                                                            110.03 8093.45
 8018.02
                108.69 8050.81
                                                                                                                     110.89
               109.42 8119.69
110.57 8188.56
                                         108.57 8136.09
111.53 8201.68
                                                                                           108.96 8155.77
113.25 8224.64
 8103.29
 8172.16
                                        112.97 8319.77
112.04 8460.81
   8231 2
                 113.2 8260.73
                                                                                            113.08 8388.65
                112.71 8424.73
                                                                   112.73 8473.93
                                                                                            112.38 8483.77
 8490.33
               112.16 8503.46
                                         112.26 8536.26
                                                                  113.37 8559.22
                                                                                           113.52 8585.35
 8591.87 119.54 8598.4
8666.95 115.75 8722.44
8823.62 115.3 8853
8947.66 115.64 8967.24
                                         118.09 8627.78
                                                                  116.81
                                        115.29 8738.76
115.54 8892.17
116.01 8977.04
                                                                 115.58 8781.19
115.5 8905.23
115.71 8986.83
                                                                                             115.8 8794.25
                                                                                                                       115.5
                                                                                           115.98 8924.81
116.28 8999.89
 9019.47 116.09 9035.79
                                        117.42 9048.85
                                                                  117.51 9074.96
                                                                                            116.88 9101.07
Manning's n Values
                                        num=
                                       n Val
                                          n Val Sta
.025 1725.33
       Sta n Val
                  n Val Sta
                                                                  n Val
                                                                    .066 5587.72
                                                                                               .085
                                         Lengths: Left Channel
                                                                               Right
                                                                                              Coeff Contr. Expan.
Bank Sta: Left
                          Right
Bank Sta: Left Right
1300.68 1758.63

Ineffective Flow num=
Sta L Sta R Elev
0 1300.68 111.95
1758.63 9101.07 111.68
                                         1212.33 1503.33 1122.85
                               Elev Permanent
                     Station= 16.38
Station= 8585.35
                                                           Elevation= 133.04
Elevation= 119.55
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
                                                            Element
                                                                                                                     Channel
                                                           Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                      0.066
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                           0.066
1212.33
16976.99
17224.37
                                              0.08
                                                                                                                        0.037
                                                                                                                                         0.074
                                          129.70
116.76
                                                                                                                    1503.33
                                                                                                                                      1122.85
                                                                                                   1212.33
                                                                                                                   15656.06
                                                                                                                                     124781.50
   E.G. Slope (ft/ft) 0.000087
Q Total (cfs) 235000.00
                                                            Area (sq ft)
                                                                                                                   15656.06
                                                                                                                                     129301.90
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                   20114.31
                                                             Flow (cfs)
                                                                                                                  60352.54
                                                                                                                                      154533.20
                                                           Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                          9058.73
1.49
39.31
                                                                                                   1258.34
                                                                                                                       457.95
                                                                                                                                       7342.44
                                                                                                    1.18
                                                                                                                          3.85
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                       34.19
                                                                                                                                         16.99
                                                                                                                        34.19
6485465.0 16600
7368.25
                                        25253030.0
                                                                                                                 466.19
                                         1243.27
                                                                                                    1262.42
                                                                                                                      0.18
   Min Ch El (ft)
                                                            Shear (lb/sq ft)
                                             90.39
                                                            Stream Power (lb/ft s)
                                                                                                        0.09
                                                                                                                          0.70
   Alpha
                                               2.22
                                                                                                                                           0.11
   Frctn Loss (ft)
C & E Loss (ft)
                                                         Cum Volume (acre-ft) 230286.70 79017.84
Cum SA (acres) 25472.41 3138.17
                                               0 09
                                                                                                                                      251972 20
Warning: The cross-section end points had to be extended vertically for the computed water surface.
              Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                         RS: 175.27*
REACH: Lower Reach
TNPUT
Description: RGV-03.
Station Elevation Data
                  Elev Sta
       Sta Elev
0 123.94
                                                        Sta
                                            Elev
                                        125.36
                                                                 131.82
125.22
                                                                                          132.81
                                                                              46.96
85.37
                                                                                                        54.35 132.73
                                                            37
   66.16 129.2
116.44 122.78
                           76.51
168.22
                                        125.61
117.62
                                                                                           126.17
113.23
                                                       79.46
                                                                             239.62
                                                       206.1
                                                                                                        264.73
                                                                  114.13
   292.48
               111.35 311.7
110.21 608.15
                                        110.37
110.63
                                                     353.12
633.28
                                                                  109.93 432.26
111.69 651.94
                                                                                           110.24
112.94
                                                                                                        464.07
717.03
                                                                                                                    110.16
   515.85
               112.36 731.82
112.3 1068.84
                                        111.74
112.46
                                                     809.17
1154.9
                                                                  111.84 834.3
112.46 1165.26
   724.43
                            731.82
                                                                                834.3
                                                                                           112.18 968.31
                                                                                                                     112.38
   993.44
                                                                                            113.25 1172.66
 1191.89
                 114.5 1211.12
                                         114.25
                                                        1291
                                                                  114.46 1304.31
                                                                                           114.79 1316.15
                                                                                                                      116.4
```

117.5 1363.49 116.71 1412.3 115.25 1475.91 115.42 1666.74

115.95 1944.85 115.74 2002.55

115.14 2191.18

115.82 2601.61

111.19 3222.56

115.24 2819.38 115.4 2852.9 112.13 3048.36 111.73 3063.12

115 59

110.76

115.8 1326.5 117.1 1388.63

116.99 1444.84 115.28 1530.65

115.26 1813.19

115.93 2036.57

116.17 2438.96

115.43 2711.16 114.84 2945.03

110.25 3173.84

1381.24 1430.05 1496.62

1748.1

2020 3

2408.98

2911.52

116.67 1339.82 117.05 1394.55

115.04 1455.2 115.17 1541

115.63 1885.68 114.91 1968.52

115.28 2082.3 115.45 2230.37

115.32 2795.48 114.09 3012.04

110.02 3185.65

2478.9

115.97

116.05 1353.13 115.73 1400.47

115.71 1459.64 115.29 1622.36

115.6 1924.14 115.76 1990.71

114.92 2174.44 114.45 2237.76 116.07 2515.88

110.85 3212.23

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112.69 6455.71
  6297.04
                                                                                                           112.78 6372.26
                                                                                                           111.64 6478.44
111.79 6605.9
   6382
                                                                              111.77 6585.04
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                                                                                                           110.55 6689.34
110.57 6767.75
 6639.28
6714.37
                  111.38 6651.8
110.19 6724.12
                                                                              111.31 6681.01
110.84 6751.93
                                                                             110.84 6751.93 110.57 6767.75 112.21 6847.88 112.89 6864.58 111.53 6951.44 112.82 6985.57 112.27 7077.35 112.42 7094.05 113.21 7202.52 113.17 7219.21 112.25 7315.17 112.46 7327.68 112.71 7427.82 113.37 7440.33 112.5 7523.77 112.77 7561.33 113.38 7661.45 111.48 7686.49 111.52 7778.04 112.2 7790.8 113.53 7860.7 113.44 7872.18 113.06 7891.05 113.49 78023 0
                  112.12 6814.51
111.11 6897.96
                                                 111.4 6839.54
111.6 6935.36
  6779.23
                                                                                                                                         111 37
  6877.09
                                               112.56 7056.49
112.51 7173.32
112.54 7273.44
112.95 7402.78
112.97 7479.54
  7018.94
                  113.13 7031.46
                                                                                                                                         112.99
                  114.05 7139.94
112.07 7248.41
  7240.06
                                                                                                                                         112.98
                  112.63 7386.09
113.27 7472.65
  7452.85
                  112.42 7619.74
111.54 7755.07
                                                111.81 7636.42
111.32 7768.85
  7582.19
                                                                                                                                         110 85
  7812.48
                  112.02 7821.66
                                                112.61 7844.62
                  112.32 7936.47
                                                 112.01 7982.72
                                                                              112.06 7991.05
                                                                                                           112.28
                                                109.69 8087.02
111.74 8141.26
113.86 8218.89
                                                                                                           111.32 8107.88
113.08 8174.64
113.73 8276.3
                    110.9 8082.85
                                                                              109.75 8099.53
111.72 8162.11
113.23 8255.63
  8061.99
                                                                                                                                           113.2
                  113.86 8132.91
113.09 8212
  8195.49
                                                                                                                                         113.61
                  113.27 8292.37
114.1 8414.06
114.42 8501.31
113.34 8604.64
                                                113.53 8316.49
114.57 8427.84
                                                                              113.65
114.14
                                                                                            8329
8448.5
                                                                                                           113.45 8361.25
114.61 8473.76
  8283.19
                                                113.53 8512.79
                                                                             113.62 8519.68
113.38 8639.08
                                                                                                           113.23 8561.02113.1643
  8487.54
                                                113.08 8609.23
                                                                                                           113.29 8648.27
                                               112.95 8719.45
112.95 8788.33
109.86 8852.62
112.76 8955.95
111.61 9070.75
                                                                                                           112.89 8750.39 113.13
113.17 8811.29 113.04
109.74 8900.84 111.93
112.06 8988.09 111.8
111.35 9128.16 111.37
  8666.64
                  113.16
                                   8685
                                                                              113.05 8728.63
                  113.16 8685
112.4 8779.14
111.99 8834.25
112.34 8932.99
111.99 9043.2
                                                                             113.05 8728.63
112.14 8804.4
109.61 8891.65
111.3 8960.54
111.57 9084.53
  8820.47
   8926.1
  9021.58
  9137 34
                  111 05
                                     9158
                                                111.07 9164.89
                                                                              111.43 9185.56
                                                                                                           111.22 9199.33
                                                                                                                                         111 81
                                                110.53 9265.92
111.24 9359.53
                                                                             110.1 9284.29
111.04 9380.73
                                                                                                           110.54 9291.18
111.57 9392.91
                  110.58 9254.44
  9309.46
                  110.46 9321.97
                                                                                                                                         111.34
                  110.17 9419.76
                                                109.91 9472.57
                                                                              109.62 9501.38
                                                                                                           109.79 9513.89
                                                                                                           110.66 9630.71
  9555.62
                  109.65 9563.97
                                                110.41
                                                                  9589
                                                                              111.04 9626.54
                                                                                                                                         110.91
                                               10.41 9589
109.85 9745.81
109.6 9798.62
109.81 9860.61
110.17 9954.76
 9693.3
9782.55
                  109.79 9706.78
109.26 9791.73
                                                                              109.54
109.15
                                                                                            9752.7
9810.1
                                                                                                           109.2 9771.07
109.21 9823.87
                                                                                                                                         110.06
                  109.2 9851.43
110.04 9947.87
                                                                             110.61 9899.65
110.51 9996.09
  9835 36
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                                                                                                            110.1910018.72
10025.93
                  111.0710047.93
                                                111.4810072.96
                                                                              111.3110089.66
                                                                                                           112.7210110.52
                  112.7410131.37
112.5610232.58
                                               111.0310139.72
112.2410241.77
                                                                              110.78 10156.4
112.4210260.14
                                                                                                           112.7510164.75
111.5110276.21
10202.31
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                                               111.8910317.54
112.7 10427.6
                                                                              112.5810331.32
112.5510448.44
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111.25 10456.8
  10285.4 112.0410296.87
  10381.7
                    112.610400.21
                  112.4710498.95
116.6110573.62
                                               113.2110515.03
117.9110586.14
                                                                              112.4810523.56
119.3910606.09
  10473 7
                                                                                                            112 6310548 59
                                                                                                           116.1210652.85
10689.19
                    114.810709.13
                                                 115.5 10732.4
                                                                             115.1910776.75
                                                                                                           115.5210818.05
                                                                                                                                         115.48
                                                                            115.7910938.77
117.4611062.67
                  115.6110884.76
                                                  115.610916.53
                                                                                                           115.6110967.37
117.1111088.08
10998.33 115.9911024.55
                                              117.2511037.26
Manning's n Values num=
Sta n Val Sta n Val Sta
^ .198 5359.98 .066 5399.75
                                                                                                             n Val
                                                                             n Val
                                                                                                  Sta
                                                                                                                                           n Val
                                                                               .015 5687.63
                                                                                                              .066 5806.84
                                               Lengths: Left Channel Right
1212.33 1503.33 1122.85
77.54 Elevation= 132 56
Bank Sta: Left Right 5359.98 5806.84
                                                                                                               Coeff Contr.
                                                                                                                                           Expan.
                       Station=
                                                                      Elevation= 132.58
Elevation= 119.51
                             Station=10581.77
Right Levee
CROSS SECTION
```

RIVER: Rio Grande RS: 174.6 REACH: Lower Reach

TNPUT

Description: RGV-03, Bathymetric elevations translated from IBWC 2008

Cross-sections Station Elevation Data num= Sta Sta Elev 0 113.49 Elev Elev Sta Elev 16.38 75.36 29.49 85.19 113.72 130.73 113.86 132.07 49.15 108.12 42.59 95.02 65.53 122.92 126.49 173.65 206.43 350.78 124.5 193.31 132.15 150.71 113.53 203.15 121.59 110.35 110.86 110.02 180.2 109.71 109.79 190.03 113.02 109.95 109.82 109.79 262.2 331.1 109.88 110.03 377.03 109.87 475.44 564.02 636.19 652.6 678.84 110.07 110.31 110.07 708.37 109.75 787.1 109.59 803.5 109.73 911.76 109.68 931.45 109.55 1046.27 109.81 1207.02 109.89 1085.64 109.7 1233.27 109.54 1128.29 109.77 1252.95 109.73 1147.97 109.49 1292.32 1161.09 109.7 1308.72 1433.38 109.56 1334.97 109.13 1439.95 109.74 1364.49 108.23 1449.79 109.54 1387.46 108.16 1456.35 109.91 1410.42 106.88 1476.03 103.57 1492.44 103.41 2565.2 103.41 1600.7 103.41 2588.17 103.41 1610.54 105.77 2604.57 105.28 1620.38 109.48 2611.13 1485.87 2620 97 109 57 2647 22 109 53 2653 78 108 5 2666 9 109 13 2689 87 108 79 109.33 2844.05 109.04 2830.93 110.88 2896.54 113.45 2945.75 114.22 2991.68 2873.58 110.39 2883.42 110.16 2889.98 110.42 2906.39 115.26 2932.63 115.88 2968.72 115.23 2939.19 115.32 2975.28 116.07 2952.32 117.66 3004.81 2958.88 118.55 3027.77 114.47 3037.61 3083.54 117.16 3096.66 114.85 3044.17 116 3050.73 115.95 3067.14 113.18 3103.22 115.34 3109.79 116.13 3122.91

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116.17 3175.4 116.91 3181.96 114.07
113.05 3241.01 111.67 3257.41 112.87
111.46 3362.39 111.59 3398.48 111.31
  3188.52
                       114.31 3208.2
113.11 3323.03
                                                            111.05 3231.17
111.69 3342.71
  3421.45
                        111.68 3441.13
                                                             111.55 3483.78
                                                                                                   111.82 3516.58
                                                                                                                                        111.63 3539.55
                                                                                                                                                                             111.78
                                                                                                  111.76 3647.81 111.51 3700.3
111.29 3857.77 111.1 3880.73
                        111.45 3601.88
                                                             111.93 3637.97
   3746.23
                        111.35 3765.91
                                                               111.1 3815.12
                       111.96 3933.22
112.13 4090.69
                                                            111.56 3949.63
111.87 4107.1
                                                                                                  111.92 3969.31 111.86 4025.08
112.06 4185.83 111.96 4225.2
   4071.01
                                                                                                                                                           4225.2
                                                             112.55 4290.82
  4244.89
                       112.02 4271.13
109.48 4349.87
                                                                                                 112.07 4297.38
110.8 4369.56
                                                                                                                                        112.39 4317.06
                                                             108.99 4356.43
111.09 4425.33
                                                                                                  111.58 4369.56
111.58 4445.01
109.57 4618.89
108.9 4861.67
106.92 4950.25
111.14 5055.23
                                                                                                                                         111.9 4484.38
                        110.92 4418.77
  4402.36
                                                                                                                                                                             111.55
                      110.92 4418.77
110.11 4546.72
109.02 4773.09
108.38 4940.41
                                                            109.85 4599.21
109.15 4812.46
                                                                                                                                       109.29 4704.19
109.16 4907.6
  4710.75
                                                                                                                                                           4907.6
                                                             109.68 4946.97
                                                                                                                                        106.6 4966.65
111.32 5084.76
  4920.72
  4983.06
                             111 4989.62
                                                             111.31 5032.27
  5140.53
                       111.39 5229.11
111.36 5412.84
                                                            111.38 5284.89
111.14 5429.24
                                                                                                  111.19 5327.54
111.3 5462.05
                                                                                                                                        111.35 5373.47
111.16 5501.42
                                                                                                                                                                             111.18
                                                            111.34 5583.43
111.28 6016.49
111.4 6210.06
                                                                                                  111.12 5619.52
111.22 6049.3
111.16 6229.74
                       111.18 5567.03
111.17 5895.11
                                                                                                                                        111.35 5708.1
111.32 6157.57
  5514.54
                                                                                                                                                                             111.32
   5836.05
                       111.2 6203.5
112.03 6374.1
112.1 6731.57
  6180.53
                                                                                                                                       111.85 6236.3
                                                                                                                                                                             111.44
                                                                                                 111.16 6229.74
112.09 6534.85
112.11 6777.4
108.93 7029.49
111.19 7114.62
112.48 7180.1
108.39 7261.94
114.2 7347.07
                                                                                                                                       112 6616.87
111.52 6797.05
108.97 7042.59
112.46 7127.71
                                                            112 6485.64
112.19 6764.31
  6246 15
  6629.99
                       112.1 6731.57 112.19 6764.31
108.99 6875.62 109.06 6993.48
109.31 7068.78 110.8 7098.25
112.68 7150.63 113.27 7163.73
110.44 7235.75 109.97 7258.67
112.01 7307.78 113.67 7330.7
  6813.42
  7137.53
                                                                                                                                        113.08 7206.29
                                                                                                                                        109.34 7275.04
112.56 7376.53
                                                            113.67 7330.7 114.2 7347.07
112.31 7402.72 112.48 7422.37
90.71 7517.91 89.11 7537.91
87.41 7737.91 87.81 7777.91
  7294.68
                      112.01 /307.78
112.56 7392.9
97.51 7507.91
87.81 7697.91
107.68 7801.56
112.87 7879.94
  7389.63
7477.91
                                                                                                                                        105.14 7428.91
88.11 7617.91
  7657 91
                                                                                                                                         95.11 7785.23 104.83
                                                            108.82 7814.62
                                                                                                  111.69 7830.95
                                                                                                                                       112.15 7844.02
   7791.76
                                                            112.89 7896.27
113.07 8026.9
112.44 8088.95
                                                                                                                                        113.05 7948.52
113.18 8053.03
  7866.88
                                                                                                  113.43 7906.07
                                                                                                                                                                             113.19
                                                                                                   112.92 8039.97
  8062.83
                        111.37 8075.89
                                                                                                   111.91 8111.81
                                                                                                                                        112.66 8118.35
                                                                                                                                                                             112.51
                                                                                                  111.91 8111.81
112.54 8177.13
114.28 8265.42
112.97 8340.83
112.95 8458.85
112.42 8517.87
                       113.56 8137.94
113.16 8219.59
                                                            113.6 8154.27
114.43 8252.31
114.02 8327.71
112.84 8442.46
                                                                                                                                        112.2 8186.93 114.03
112.79 8275.26 114.24
111.53 8376.89 111.8
  8196.73
                       113.88 8304.76
111.76 8419.51
  8285 09
                                                                                                                                        112.6 8478.52
112.53 8524.42
  8485.08
                       112.58 8494.92
                                                             113.86 8504.75
                                                                                                                                                                             113.91
                        113.69 8544.09
                                                             112.31 8563.76
                                                                                                   113.21 8573.6
                                                                                                                                        112.54 8583.43
                                                            111.67 8642.45
112.29 8714.57
112.35 8803.09
                       111.92 8622.78
111.69 8688.35
  8606.38
                                                                                                   113.12
                                                                                                                          8649
                                                                                                                                        114.25 8662.12
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                                                                                                   111.83 8757.2
112.59 8812.93
                                                                                                                                        112.18 8773.59
112.19 8829.32
  8671.95
  8783.42
                        113.17 8793.26
                                                                                                  112.59 8812.93
112.68 8904.73
112.76 8983.41
113.58 9085.04
112.84 9157.17
                                                                                                                                      112.19 8829.32
113.93 8927.68
112.45 9016.2
113.26 9104.72
113.27 9180.12
                       113.31 8855.55
112.15 8957.18
                                                            114.99 8878.5
112.17 8963.74
  8842.44
  8940.79
                       113.55 9048.98
                                                             113.17 9071.93
  9026.03
                        113.18 9124.39
                                                                             9137.5
                                                                                                 112.84 9157.17 113.27 9180.12

112.1 9268.64 111.52 9288.31

110.8 9389.95 111.29 9399.78

112.15 9501.41 111.51 9540.76

109.89 9619.44 108.06 9622.72

114.32 9658.78 111.17 9665.34

113.3 9707.96 112.89 9724.35

113.64 9812.87 113.23 9829.26

113.89 9963.68 113.04 9889.91
                                                            112.9 9255.53
111.7 9367
112.27 9471.91
111.18 9603.05
113.32 9645.67
  9209.63
                        112.79 9226.02
                                                                                                                                                                             111.67
                       110.65 9334.21
112.05 9445.68
  9426.01
                                                                                                                                                                             111.46
  9547.31
9632.55
                       111.83 9583.38
110.55 9639.11
                                                            112.85 9701.4
113.18 9803.04
113.37 9881.72
  9681 73
                        113.28 9691.57
                                                                                                                                                                             113 65
                      113.88 9773.53
113.3 9868.61
  9848.93
                                                                                                                                                                             113.26
                                                            113.37 9881.72 113.89 9963.68 113.2410048.92 113.7610068.59 113.1710153.83 112.7410180.06 111.9910252.19 111.74 10281.7 111.3510366.94 11110386.61 110.53 10524.3 109.55 10540.7 110.3910642.33 111.2410648.89
                                                                                                                                        113.04 10098.1
112.6810209.57
                       113.8110042.37
10009.58
10114.49 112.8 10144
10225.96 111.7910245.63
10343.99 111.12 10357.1
                                                                                                                                                                             112.25
                                                                                                                                       111.8310298.09 111.38
110.9610455.46 110.14
109.9910583.32 109.8
110.8510658.72 109.21
10471 85
                       110.5710484.96
10593.15
                        110.7810622.66
                                                             108.2710734.13
10681.67
                       108.4610701.34
                                                                                                  108.3610743.96
                                                                                                                                               10810776.75
                                                                                                                                                                             107.97
10783.31 109.2910802.98
10865.27 109.1910884.94
                                                            109.9810832.48 109.7710835.76
109.0110904.61 109.24 10937.4
                                                                                                                                        110.1810852.15
                                                                                                                                          108.610980.02
                                                                                                                                                                             108.94
                                                            110.0811052.14 109.8911101.32
112.6311183.28 112.7 11196.4
  11012.8
                         109.911035.75
                                                                                                                                        110.1811140.66
                       112.2211163.61
11153.78
                                                                                                                                        114.1711212.79
                                                                                                                                                                              114.57
                                                            111.3311235.74
114.2411311.14
                                                                                                  110.8911248.85
113.2611386.55
11219 35
                       114.1211229.18
                                                                                                                                        114.1111255.41
11268.52
                        115.1811284.92
                                                                                                                                         112.14 11409.5
11425.89
                       112.2811461.96
                                                               112.411478.35
                                                                                                  110.79 11484.9
                                                                                                                                        112.1811520.97
                                                                                                                                                                              113.56
                      112.8511557.03
114.5511688.17
                                                            114.8 11576.7
114.4211707.84
                                                                                                  119.1611586.54
115.5611730.79
                                                                                                                                        119.3111606.21
115.0311786.53
 11537.36
11655.39
11855.38 115.6811970.12 115.5611993.07 115.9812025.86
                                                                                                                                        117.4812081.59
Manning's n Values
           Sta n Val Sta n Val Sta n Val
0 .198 7389.63 .066 7428.91 .015
                                                                                                     .015 7785.23
                                                                                                                                            .066 7830.95
                                                                                                                                                                                   .069
Bank Sta: Left
                                       Right
                                                            Lengths: Left Channel
                                                                                                                      Right
                                                                                                                                           Coeff Contr.
                                                                                                                                                                                Expan.

        Radik
        At June
        Left Charmer
        Right

        7839.63
        7830.95
        3662.8
        2000 1560.98

        Left Levee
        Station=
        108.12
        Elevation=
        132.35

        Right Levee
        Station=11579.98
        Elevation=
        119.49

| Star | 
CROSS SECTION OUTPUT Profile #Design Flow
                                           129.43 Element
    E.G. Elev (ft.)
                                                                                                                                                                              Channel
                                                                                         Wt. n-Val.
     Vel Head (ft)
                                                                                                                                                                                  0.016
                                                              128.82
118.75
                                                                                        Reach Len. (ft)
Flow Area (sq ft)
    W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                                    3662.80
                                                                                                                                                                              2000 00
                                                                                                                                                                                                       1560 98
                                                                                        Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
    E.G. Slope (ft/ft)
                                                    0.000071
                                                                                                                                                 105691.80
                                                                                                                                                                              15140.63
                                                                                                                                                                                                       62088.79
                                                             235000.00
                                                                                                                                                                              127906.00
                                                                                                                                                                                                          67230.91
     Top Width (ft)
                                                                                                                                                                                                        4250.64
                                                            11948.83
                                                                                                                                                    7256.87
                                                                                                                                                                                441.32
    Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                     1.28
                                                                                                                                                          0.38
                                                                                                                                                                                   8.45
                                                                                                                                                                                                            14.61
    Conv. Total (cfs)
Length Wtd. (ft)
                                                            27866940.0
                                                                                         Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                       4727066.0
                                                                                                                                                                                  15167450.0
                                                                                                                                                                                                                 7972424.0
                                                            2650.93
                                                                                                                                                                                450.61
                                                                                                                                                     0.06
    Min Ch El (ft)
                                                                  87.41
                                                                                         Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                                                 0.15
                                                                                                                                                                                                             0.06
                                                                                                                                                                                      1.26
     Alpha
```

Warning: The cross-section end points had to be extended vertically for the computed water surface. Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

Cum Volume (acre-ft)

Cum SA (acres)

0.15

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

224607.40

25116.57

77430.64

3091.61

244350.10

27406.43

Frctn Loss (ft)

C & E Loss (ft)

3136.03 113.43 3152.43

RIVER: Rio Grande REACH: Lower Reach

RS: 174.2

 $\begin{tabular}{ll} INPUT \\ Description: RGV-03, Bathymetric elevations translated from IBWC 2008 \\ \end{tabular}$

| Descripti | | | | elevatio | ns trans | siaceu ii | om IBWC | 2008 | |
|---|---|--|--|--|--|--|--|---|---|
| Station E | | ss-sectio
n Data | num= | 460 | | | | | |
| Sta | Elev | | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 115.49 | 32.52 | 115.73 | | 117.4 | 55.29 | 118.25 | 71.55 | 125.17 |
| 84.55 | 131.09 | 91.06 | 131.84 | 110.6 | 132.04 | | 131.74 | | 131.16 |
| 130.28
199.18 | 128.31
113.54 | 153.25
209.02 | 120.42
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11079.36
11282.58
11371.09 | 91.7
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| 9148.7 9230.65 9348.65 9348.65 9512.54 9656.77 9771.49 9827.22 9905.88 9991.11 10076.33 10138.61 10256.62 103256.62 10335.28 10420.51 10482.79 10558.18 10630.29 10797.46 10918.74 10971.19 11099.02 11305.53 Manning's Sta 85 Ineffectii Sta L | 110.28 109.08 109 108.14 108.04 106.91 108.06 108.12 110.15 106.522 108.11 1107.011 110.91 113.93 114.511 111.467 115.092 113.11 111.467 115.092 114.677 115.098 114.677 115.098 114.677 115.098 114.677 115.098 114.677 115.098 114.677 115.098 | 8896.3 8974.97 9060.2 9155.26 9237.2 9378.15 9555.15 96573.16 9781.33 9843.61 00092.72 10191.06 10279.56 10341.84 10427.06 10509.01 10571.29 10653.24 10810.57 10872.85 10928.58 11194.08 8718.07 Right 915.97 Right 915.97 num= Elev | 104.79 110.26 109.57 108.63 108.79 107.63 107.77 108.5 108.34 106.57 108.5 108.34 107.94 106.66 107.13 116.68 117.13 115.8 114.89 111.48 111.08 111.48 111.08 118.79 115.12 | 8823.07 8902.86 9014.31 9092.98 9191.31 9266.7 9397.82 9564.99 9686.27 9797.72 9859.99 9928.83 10040.28 10105.83 10200.89 10302.51 10368.06 10446.73 10522.12 10584.4 10669.63 10817.13 10889.24 10938.41 11030.19 11220.31 11328.47 4 Sta 8891.07 3: Left C 472.5 1 ent | 88.2 105.35 109.84 109.25 108.52 108.01 107.71 107.55 108.65 107.04 106.95 106.696 114.03 114.58 115.56 114.31 112.91 116.299 111.21 116.299 117.199 | 8840.07
8909.42
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9292.93
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9617.43
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9810.83
9783.11
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9958.33
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10328.73
10404.12
10469.68
10745.02
10846.63
10958.08
11079.36
11282.58
11371.09 | 91.7
87.1
110.99
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107.5
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113.2
113.85
117.6
114.65
114.65
111.36
112.86
115.68
117.19 |

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Blocked Obstructions
Sta L Sta R Elev
0 1278.54 109.62
                                               num=
```

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 129.10 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|-----------|--------------|
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.066 | 0.048 | 0.068 |
| W.S. Elev (ft) | 129.08 | Reach Len. (ft) | 472.50 | 1764.50 | 2016.00 |
| Crit W.S. (ft) | 114.02 | Flow Area (sq ft) | 157885.40 | 10659.26 | 40920.17 |
| E.G. Slope (ft/ft) | 0.000048 | Area (sq ft) | 157885.40 | 10659.26 | 45261.86 |
| Q Total (cfs) | 235000.00 | Flow (cfs) | 172474.80 | 22380.62 | 40144.56 |
| Top Width (ft) | 11242.58 | Top Width (ft) | 8456.16 | 331.30 | 2455.12 |
| Vel Total (ft/s) | 1.12 | Avg. Vel. (ft/s) | 1.09 | 2.10 | 0.98 |
| Max Chl Dpth (ft) | 42.37 | Hydr. Depth (ft) | 18.67 | 32.17 | 16.67 |
| Conv. Total (cfs) | 34067530.0 | Conv. (cfs) | 25003370. | 0 3244479 | .0 5819686.0 |
| Length Wtd. (ft) | 843.66 | Wetted Per. (ft) | 8463.19 | 348.30 | 2472.36 |
| Min Ch El (ft) | 86.71 | Shear (lb/sq ft) | 0.06 | 0.09 | 0.05 |
| Alpha | 1.16 | Stream Power (lb/ft s) | 0.06 | 0.19 | 0.05 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 213525.80 | 76838.36 | 242426.70 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 24455.95 | 3073.88 | 27286.28 |
| | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

| REACH: Lowe | er Reac | | RS: 174 | 1.10* | | | | | |
|------------------------|------------------|--------------------|------------------|--------------------|--------|--------------------|---------------|--------------------|------------------|
| INPUT | | | | | | | | | |
| Description | n: RGV- | -03, | | | | | | | |
| Station Ele | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| | 123.76 | 17.22 | 123.9 | 29.28 | 125.16 | 44.78 | 131.6 | 58.58 | 132.08 |
| | 131.72 | 72.94 | 130.13 | 88.76 | 124.39 | 100.83 | 120.64 | 116.04 | 117.01 |
| | 115.41 | 155.55 | 114.81 | 166.32 | 115.04 | | 114.78 | 278.91 | 115.03 |
| | 114.54 | 294.01 | 111.39 | 300.05 | 109.99 | | 109.87 | 312.11 | 111.6
110.15 |
| | L11.29
L07.57 | 351.36
478.79 | 111.16
106.94 | 405.68
489.56 | 111.31 | 453.65
541.5 | 111
108.64 | 460.83
562.63 | 107.83 |
| | 106.57 | 601.87 | 106.37 | 613.94 | 106.06 | 644 | 106.01 | 687.1 | 106.07 |
| | 106.04 | 740.97 | 105.8 | 758.92 | 105.99 | 773.3 | 106.54 | 780.48 | 107.23 |
| | 107.58 | 805.61 | 107.18 | 823.58 | 103.67 | 827.17 | 103.37 | 991.24 | 103.37 |
| 1000.28 | L03.77 | 1018.4 | | 1033.49 | | 1042.55 | 103.76 | 1054.61 | 103.93 |
| | | | 106.07 | 1096.87 | 108.1 | 1105.93 | | 1111.96 | 108.88 |
| | | | | | | 1205.53 | | 1244.77 | 106.62 |
| | | | | 1301.24 | | 1312.02 | 108.6 | 1322.8 | 109.41 |
| | | 1351.52
1525.47 | | 1394.62 | | 1408.99
1552.64 | 109.83 | 1440.96 | 109.91 |
| | | | | 1537.54
1667.33 | | 1718.64 | | 1579.8
1772.97 | 109.42 |
| | | 1824.28 | | 1836.38 | | 1865.11 | | 1908.21 | 109.57 |
| | | 2038.58 | | | | 2153.27 | | 2201.56 | 109.57 |
| | | | | | | 2370.59 | 109.55 | 2388.7 | 109.7 |
| 2409.82 | 109.63 | 2418.88 | 109.02 | 2430.95 | 107.02 | 2436.99 | 106.75 | 2443.03 | 107.3 |
| | | 2458.11 | 109.66 | 2503.4 | | 2539.61 | | 2593.94 | 109.38 |
| | | | | 2691.16 | | 2752.22 | | 2777.35 | 109.3 |
| | | | | 2874.32 | | 2906.65 | 109.24 | 2928.97 | 109.37 |
| | | 3034.61 | | 3082.63 | | 3107.77 | | 3122.14 | 109.16 |
| | 109.31 | | | 3212.68
3251.92 | 109.7 | 3218.72
3265.8 | 109.31 | 3227.77
3272.98 | 107.7
108.07 |
| | | 3294.53 | | | | 3337.63 | | 3348.41 | 109.97 |
| | | 3448.97 | | 3477.69 | 110.03 | 3496.4 | | 3517.53 | 110.31 |
| | | | | 3599.02 | | 3629.21 | | 3644.29 | 111.39 |
| | 111.42 | 3683.53 | | 3725.79 | | 3739.88 | | 3761.43 | 111.39 |
| | 111.32 | 3869.17 | 111.39 | 3928.01 | | 3949.14 | 111.33 | 3991.4 | 111.15 |
| | | 4063.11 | | 4077.47 | | 4100.05 | | 4112.13 | 111.13 |
| | | 4145.33 | | | 110.71 | 4196 | | 4217.54 | 110.79 |
| | | 4264.23 | | | 110.7 | 4321.7 | | 4379.16 | 110.73 |
| | | 4433.03 | | | | 4479.72
4659.3 | | 4512.05
4679.58 | 110.89 |
| | | 4580.28
4716.76 | | 4619.79
4742.95 | 110.68 | 4774.22 | | 4810.14 | 110.6
110.25 |
| | | 4889.15 | | 4918.01 | | 4954.24 | | 5035.73 | 109.87 |
| | | | | 5126.19 | 109.89 | 5147.4 | | 5159.48 | 109.84 |
| | | | | 5201.73 | 109.84 | 5207.77 | | 5213.81 | 107.75 |
| | | | | 5244.71 | | 5269.85 | | 5287.81 | 109.19 |
| | | 5345.27 | | 5406.33 | | 5431.47 | | 5442.24 | 109.32 |
| | | 5518.66 | | 5560.91 | | 5576.01 | | 5661.32 | 109.42 |
| | 109.35 | 5797.8 | | 5815.76 | | 5855.26 | | 5898.96 | 109.39 |
| | 109.58 | 5953.3
6171.31 | 109.49 | 5963
6196.45 | | 5988.15
6210.82 | | 6070.75
6221.59 | 109.59
110.25 |
| | | 6279.06 | | | | 6324.54 | | 6339.64 | 111.23 |
| | | | | 6406.04 | | 6460.38 | | 6481.51 | 111.15 |
| 6490.58 | 111.31 | 6529.83 | 111.34 | 6572.1 | 110.5 | 6602.29 | 110.68 | 6644.56 | 110.51 |
| | | 6684.89 | | 6710.04 | | 6713.62 | | 6810.64 | 110.98 |
| | 110.87 | 6898.2 | | 6937.46 | | 6952.55 | | 6982.75 | 110.9 |
| 6994.82 | | 7028.04 | 110.83 | 7115.6 | | 7127.69 | | 7182.03 | 111.03 |
| | | 7339.05
7532.29 | | 7384.34
7547.39 | | 7396.41
7556.44 | | 7438.69
7589.94 | 111.02
111.4 |
| | | 7625.89 | | 7707.43 | | 7722.52 | | 7776.88 | 111.34 |
| | | | | 7855.39 | | 7888.04 | | 7900.68 | 111.36 |
| | | | | 8075.81 | | 8125.08 | | 8164.58 | 111.2 |
| 8211.69 | 111.44 | 8220.75 | 111.3 | 8272.33 | 111.31 | 8290.29 | 111.39 | 8311.83 | 111.17 |
| | 111.27 | 8369.3 | | 8380.08 | | 8420.04 | | 8474.39 | 110.1 |
| | 110.02 | 8522.7 | | 8571.02 | | 8606.34 | | 8617.11 | 110.05 |
| | | 8685.34 | | 8721.26 | | 8796.69 | | 8814.64 | 109.77 |
| | | 8854.86 | | | | 8886.47 | | 8908.02 | 109.56 |
| 8922.38 1
8990.62 1 | | 8933.16 | | 8954.71 | | 8965.48 | | 8979.85 | 109.02 |
| | | 9069.25 | | 9084.34 | | | | 9099.45 | 109.1 |
| | | 9120.58 | 110.24 | 9127.1 | | 9153.79 | | 9168.89 | 111.26 |
| | | 9186.44 | | 9197.37 | 112.26 | 9205.57 | 110.86 | 9226.08 | 106.73 |
| 9228.17106 | | | | 9254.78 | | 9271.19 | 105.03 | 9298.53 | 104.21 |
| 9306.73 | 102.78 | 9315.17 | 102.11 | 9331.41 | | 9345.53 | 98.8 | 9362.2 | 97.3 |
| 9393.87 | | 9409.71 | | 9416.379 | | | | 9443.04 | 89.88 |
| 9473.9 | | 9497.21 | | 9511.38 | | 9524.72 | | 9553.88 | 86.35 |
| 9554.03 | | 9560.65 | | 9564.75 | | 9572.75 | | 9577.63
9664.34 | 112.26 |
| 9586.11 1
9677.38 | | 9606.14
9692.88 | | 9626.16
9718.68 | | 9651.31
9740.41 | | 9744.76 | 110.38 |
| | | 9799.08 | | 9818.64 | | 9849.07 | | 9886.38 | 109.58 |
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               110.3410051.18
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                                                                 110.210088.12
110.89 10179.4
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               110.1110220.69
                                        110.0910227.21
                                                                                            111.510246.77
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10257.63
               110.0310266.71
                                        110.2810286.72
                                                                  109.8610313.43
                                                                                          110.1110331.52
10355.42
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               110.2310457.57
110.5210527.11
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                                         113.810587.96
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                                                                                               11410607.52
               114.2410650.98
                                        114.1710760.47
113.5910842.22
                                                                                           113.0710798.76
10703.14
               114.02 10722.7
                                                                 113.22 10787.9
                                                                 113.5110847.21
116.810898.73
 10810.66113.076610833.53
                                                                                           114.6710860.58
10866.13 115.5210872.65
10913.94 121.6510921.46
10966.07 113.7910980.28
                                                                                          117.4510905.25 119.51
117.4610951.48115.2959
                                        115.3710894.38
                                                                 119.8510939.01
112.8710999.24
                                        121.2810928.98
113.9510989.77
                                                                                           113.64 11011.7 114.11
11036.77 113.9111060.85 113.5311075.06
11131.92 116.7811192.18 117.0211209.73
                                                                 113.5311089.27
                                                                                           113.8911122.45
                                                                 116.1911227.27
                                                                                           116.9611259.87
                               num= 4
Sta n Val Sta
31.41 .025 9586.11
Manning's n Values
                                                                  n Val
       Sta n Val Sta
0 .066 9331.41
                                                                     .06610928.98
                                        Lengths: Left Channel 472.5 1764.5
Bank Sta: Left Right 9226.08 9586.11
                          Right
                                                                                              Coeff Contr.
                                                                               2016
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9586.1111259.87 112.86 T
                                        58.58
                 Station= 58.58
Station=10913.94
                                                           Elevation= 132.08
Right Levee States.
Blocked Obstructions
The Sta R Elev
                                                          Elevation= 121.655
                                      num=
  Sta L Sta R Elev
440.62 1356.28 109.46
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
Description: RGV-03, New Cross-section, Bathymetric elevations translated from
                    IBWC 2008 Cross-sections
Station Elevation Data
                                      num=
                                                      461
       Sta Elev
0 132.04
                                Sta
                                           Elev
                                                          Sta
                                                                    Elev
                                        132.12
                               6.56
                                                                131.57
                                                                               19.68
                                                                                         129.96
    52.47
               119.47
116.08
                           72.15
196.77
                                                      78.71
223
                                                                             98.38
245.96
                                        116.23
                                                                   115.9
                                                                                          116.15
                                                                                                     141.02
                                                                                                                   115.96
                                        115.82
                                                                115.76
                                                    275.48
337.79
465.68
                                                                  105.8
                                                                                                       295.15
383.7
   262.36
                 108.8
                            268.92
                                        106.01
                                                                             282.03
                                                                                           109.28
                                                                                                                    108.67
               108.75
108.32
                            324.67
452.57
                                                                             370.58
495.2
                                                                 108.38 495.2
107.73 554.23
103.32 1019.92
105.02 1075.67
                                                                                                       514.88
   409.93
                                        108.48
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   521.44
580.47
               108.15
                                                     547.67
609.98
                                                                                          106.92 564.07
103.32 1029.75
                            531.27
                                        108.47
                            596.86
                                          103.9
               103.47 1055.99
107.17 1111.74
 1049 43
                                        103.84 1065.83
                                                                                           104.11 1088.78
                                                                 108.73 1134.7
110 1223.24
                                        107.9 1118.3
111.62 1170.77
               114.35 1160.93
 1151.09
                                                                                           109.68 1252.76
                                                                                                                    109.91
                                                                 109.83 1393.78
110.08 1570.87
                                                                                          110.07 1413.45
109.9 1600.38
               109.82 1318.35
                                         110.01 1344.58
 1436.41
               110.11 1452.81
                                        109.92 1508.56
                                                                                                                    110.05
               109.53 1629.9
109.3 1754.52
109.2 1892.25
109.24 2118.54
                                        109.64 1659.41
109.15 1810.27
                                                                 109.11 1685.65
109.34 1816.83
                                                                                          109.27 1711.88
109.17 1843.06
 1744.68
   1869.3
                                        109.42 1925.05
109.44 2141.49
                                                                                           109.31 1997.2
109.45 2200.52
                                                                  109.15 1938.17
                                                                  109.25 2157.89
                                        109.18 2256.27
 2210.36
               109.34 2239.88
                                                                  109.33 2282.51
                                                                                           109.18 2334.98
               109.87 2377.61
109.68 2518.63
                                        109.41 2397.29
109.51 2538.31
                                                                  109.53 2459.6
109.8 2561.26
                                                                                           109.61 2485.84
                                                                                                       2571.1
 2492.39
                                                                                           109.61
                                                                                          104.97 2607.17
108.99 2695.72
               105.91 2584.22
109.81 2623.57
                                        104.34 2590.78
109.36 2639.97
                                                                 103.8 2597.34
109.32 2662.93
 2577.66
 2613.73
                                                                                          108.9 2843.29
109.14 3049.9
109.07 3167.96
109.11 3282.74
               108.9 2735.07
108.88 2872.81
                                        108.92 2761.31
109.1 2925.28
109.05 3125.33
                                                                 109.1 2803.94
108.96 2974.47
 2702.28
  3072.86
               109.14 3115.49
                                                                  109.21 3158.12
                                                                                                                    109.27
               109 3240.11
109.02 3371.28
                                        109.16 3246.67
109.18 3394.24
                                                                  109.01 3269.62
109.02 3417.2
  3207.31
                                                                                           109.63 3433.59
  3354.89
               108.59 3449.99
108.92 3512.3
                                        105.14 3459.83
109.02 3531.98
                                                                 104.78 3466.39
108.79 3577.89
                                                                                          106.31 3472.95
108.71 3610.68
  3440.15
  3476.23
 3627.08
3784.49
               108.84 3643.48
108.73 3807.45
                                        109.08 3695.95
109.46 3817.29
                                                                 108.88 3741.86
110.12 3853.36
110.7 3945.19
                                                                                          109.07 3764.82
110.51 3869.76
                                        110.6 3932.07
110.49 4043.57
110.65 4210.82
 3886 16
               110.31 3902.55
                                                                                           110.39 3961.58
                                                                                                                    110 58
                                                                 110.7 3945.19
110.65 4053.41
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               110.65 4532.21
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               110.71 5014.3
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                                        110.17 7342.89
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                                        110.23 7579.1
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                                        110.24 7966.23
110.27 8081.06
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               110.17 7917.02
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               111.46 8143.39
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                                        111.93 8153.23
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               110.96 8504.28
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                                        111.04 8527.25
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               110.89 8865.18
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111.04 9121.08 110.86 9150.61 110.98

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9167.01 110.86 9203.1 110.99 9226.07 110.79 9317.93 110.92 9334.34 111.05 9344.18 110.84
                                                                                                                                                     110.84 9360.58 110.98 9426.2
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                                   109.28 9829.75 109.98 9836.31 112.83 9796.94 112.63 9813.44 109.29 109.28 9829.75 109.98 9836.31 112.02 9852.71 112.51 9872.4 111.33 109.38 9892.08 109.35 9905.2 110.52 9918.33 113.06 9931.45 112.68 108.35 9954.42 105.34 9957.7 104.76 9995.7 101.93 10014.7 101.7 100.74 10025.7 99.4 10032.7 96.42 10038.7 94.5 10054.7 91.7 90.6 10103.7 89.1 10119.7 88.2 10136.7 87.9 10152.7 87.1 86.8 10200.7 86.2 10216.7 861.0216.88 104.7610223 45 100.75 100.74 100.75 113.8510239 95
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                                                                                                                                                                                                               113.6510449.82 113.32
  10410.45 113.6910413.73 114.110430.14 10476.07 113.6410508.88 1133.0310525.28 10581.06 112.76 10590.9 113.4110600.74 10649.96 113.2710689.33 113.6310699.17 10761.5 114.210771.35 113.810781.19 10814 113.310833.68 112.2810859.93
                                                                                                                                                                                                                                                                         113.19
                                                                                                                                                     113.17 10728.7
                                                                                                                                                                                                                  113.510738.54
                                                                                                                                                                                                                                                                         113.38
                                                                                                                                                     113.8310787.75
112.3610869.77
                                                                                                                                                                                                                114.1110876.33
                                                                                                                                                                                                                                                                         116.38
                                                                                                                                                                                                               122.9910928.83 122.49
111.93 10968.2 113.76
112.87 11053.5 117.84
  10882.9 117.2410896.02 121.7510909.14 124.1410925.55 10941.95 116.3710945.23 115.6610955.07 114.8510961.64
  10981.32 113.5311010.85 112.3411020.69 112.2511030.53 11060.06 118.4811079.75 118.7611099.43 118.6211112.55
  11148.64 116.56
 Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta
0 .066 9957.7 .02510256.25 .06610909.14
                                                                                                                                                                                                                   .085
Bank Sta: Left Right 994510256.25 1056.67 1804.67 1796

Ineffective Flow num 1 1 180256.2511148.64 114.84 T

Left Levee Station= 6.56 Elevation= 132.12
                                                                                                                                                                                                                     Coeff Contr. Expan.
                                                                                                                         Elevation= 132.12
Elevation= 124.14
 104205.2511148.64 114.84 T

Left Levee Station= 6.56

Right Levee Station=10909.14

Blocked Obstructions num=

Sta L Sta R Elev

0 1118.3 108.73
  CROSS SECTION OUTPUT Profile #Design Flow
                                                                                           129.03
                                                                                                                                  Element
        E.G. Elev (ft)
                                                                                                                                                                                                                                   Left OB
                                                                                                                                                                                                                                                                       Channel
                                                                                                                                                                                                                                                                                                               Right OB
                                                                                                                                                                                                                                         0.066
         Vel Head (ft)
                                                                                                                                         Wt. n-Val.
                                                                                                                                                                                                                                                                                 0.027
        W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                   128.99
                                                                                                                                       Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                                                                                                                                  1056.67
                                                                                                                                                                                                                                                                         1804 67
                                                                                                                                                                                                                                                                                                                1796.00
                                                                                                                                                                                                                                                                         10407.51
                                                                             0.000041
235000.00
11126.15
                                                                                                                                      Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
        E.G. Slope (ft/ft)
Q Total (cfs)
                                                                                                                                                                                                                                                                         10407.51
                                                                                                                                                                                                                                                                                                                13387.69
                                                                                                                                                                                                                                   189750.10
        Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                                                                                                                                                9922.51
                                                                                                                                                                                                                                                                                                                   892.39
                                                                                                                                                                                                                                                                          311.25
                                                                                                                                                                                                                                   1.02
                                                                                                           1.13
                                                                                                                                                                                                                                                                                    3 47
                                                                                                42.99
                                                                                                                                                                                                                                                                                                                    13.34
                                                                                                                                                                                                                                                                             33.44
        Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                                                                       Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                                                                                                      29602890.0
                                                                                              36662320.0
                                                                                                                                                                                                                                                                                    5638294 0
                                                                                                                                                                                                                                                                                                                             1421132 0
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Shear (lb/sq ft) Stream Power (lb/ft s)

Cum SA (acres)

86.00

0.05

0.00

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Cum Volume (acre-ft) 209803.30 75942.71 239771. Cum SA (acres) 24257.02 3046.28 27131.35

9934.16 334.72 0.05 0.08

0.08

911.29

0.03

239771.60

CROSS SECTION

Alpha Frctn Loss (ft)

RIVER: Rio Grande

C & E Loss (ft)

REACH: Lower Reach RS: 173.33*

INPUT

| INPUI | | | | | | | | | |
|-----------|---------|---------|--------|---------|--------|---------|--------|---------|--------|
| Descripti | on: RGV | -03, | | | | | | | |
| Station E | | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 131.92 | 10.8 | 131.65 | 16.2 | 130.6 | 32.4 | 125.69 | | 122.67 |
| 59.4 | 119.55 | 64.8 | 119.01 | 114.94 | 116.39 | 132.18 | 116.02 | 183.9 | 115.91 |
| 202.5 | 116.09 | 207.9 | 115.45 | 216.01 | 111.27 | 221.41 | 109.4 | | 109.26 |
| 232.2 | 111.58 | 243 | 111.17 | 267.31 | 110.96 | 305.11 | 111.01 | 315.91 | 111.12 |
| 337.5 | 110.96 | 372.61 | 111.04 | 383.4 | 110.96 | 407.71 | 111.16 | 437.4 | 111.04 |
| 450.91 | 110.59 | 456.31 | 110.08 | 464.41 | 108.38 | 477.91 | 108.03 | | 107.96 |
| 517.22 | 107.17 | 540.22 | 104.94 | 557.46 | 103.89 | 563.21 | 104.06 | | 105.63 |
| 632.16 | 105.21 | 787.33 | 105.05 | 827.57 | 105.1 | 839.72 | 105.25 | | 105.79 |
| 864.01 | 105.19 | 877.52 | 106.24 | 885.62 | 105.64 | 896.41 | 105.91 | | 107.75 |
| 920.72 | 108.86 | 934.22 | 111.83 | 942.32 | 112.74 | | 112.54 | | 110.18 |
| 963.92 | 108.63 | 976.99 | | 1007.12 | | 1031.42 | | 1066.52 | 107.65 |
| 1085.42 | | 1107.02 | | 1147.52 | | 1163.72 | | 1182.62 | 107.85 |
| 1196.12 | | 1242.02 | | 1293.33 | | 1317.62 | | 1328.42 | 107.46 |
| 1341.93 | | 1366.22 | | 1387.83 | | 1409.42 | | 1436.43 | 107.31 |
| 1444.53 | | 1490.43 | | 1539.03 | | 1557.92 | | 1584.93 | 107.21 |
| 1595.73 | | 1644.33 | | 1695.35 | | 1744.23 | | 1763.13 | 107.39 |
| 1776.63 | | 1819.83 | | 1833.27 | | 1850.51 | | 1879.23 | 107.49 |
| 1896.5 | | 1907.99 | | 1925.23 | | 1935.93 | | 1948.22 | 110.93 |
| 2011.43 | | 2045.92 | | 2089.84 | | 2108.73 | | 2116.83 | 108.63 |
| 2127.63 | | 2133.04 | | 2138.44 | | 2146.53 | | 2151.93 | 109.58 |
| 2160.03 | | 2192.44 | | 2224.83 | | 2273.44 | | 2308.53 | 108.99 |
| 2365.24 | | 2408.43 | | 2448.93 | | 2482.69 | | 2534.41 | 109.19 |
| 2565.04 | | 2600.14 | | 2608.24 | | 2640.64 | | 2667.64 | 109.18 |
| 2762.14 | | 2794.54 | | 2813.44 | | 2826.94 | | 2832.34 | 108.84 |
| 2840.44 | | 2848.54 | | 2862.04 | | 2891.74 | | 2907.94 | 108.96 |
| 2945.74 | | 2972.74 | | 2986.24 | | 2999.74 | | 3042.94 | 109.04 |
| 3080.74 | | 3099.64 | | 3115.84 | | 3134.74 | | 3142.84 | 109.87 |
| 3172.54 | | 3199.54 | | 3213.04 | | 3237.34 | | 3248.14 | 110.03 |
| 3285.94 | | 3299.45 | | 3329.14 | | 3402.04 | | 3429.04 | 110.2 |
| 3466.84 | | 3485.75 | | 3523.54 | | 3596.45 | | 3612.64 | 110.15 |
| 3620.75 | | 3631.55 | | 3661.24 | | 3699.05 | | 3704.45 | 110.18 |
| 3731.45 | | 3747.01 | | 3769.25 | | 3787.25 | 110.43 | 3793 | 110.24 |
| 3810.24 | | 3827.48 | | 3833.22 | | 3856.21 | | 3912.36 | 110.16 |
| 3976.9 | | 4023.06 | | 4033.85 | | 4060.86 | | 4139.16 | 110 |
| 4155.36 | | 4171.56 | | 4195.86 | | 4201.26 | | 4295.76 | 110.06 |
| 4333.22 | | 4352.46 | | 4379.47 | | 4457.76 | | 4468.56 | 109.94 |
| 4492.86 | | 4498.26 | | 4546.86 | | 4557.66 | | 4568.47 | 109.97 |
| 4598.17 | 110.29 | 4606.26 | 110.06 | 4611.67 | 108.05 | 4617.07 | 107.19 | 4625.17 | 108.91 |
| | | | | | | | | | |

109.51 5011.28 109.57 5243.48

109.65 5476.87

109.62

109.4 4841.17

109.65 4976.17 109.52 5229.98

109.64 5435.19

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109.6 5292.08
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                                                                                           109.68 5610.69
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                                                        109.62 5572.89
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  5660.77
                      109.36 5672.26
                                                          109.3 5695.26
                                                                                                                                    111 5751.1
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                      110.98 5794.33
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                                                        111.17 5832.14
110.34 6075.24
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110.23 6123.86
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110.32 6691.09
110.93 6766.72
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110.81 6739.71
110.91 6861.27
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110.83 7234.03
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                      110.17 6172.48
                                                        110.36 6199.49
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                                                      110.98 7183.67 110.83 7234.03 110.93 7252.61

110.71 7366.39 110.76 7401.5 110.71 7433.92

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110.68 7861.49 110.73 7907.44 110.55 7936.17

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111.89 8079.5 109.67 8087.6 109.68 8093.01

111.82 8128.12 111.04 8141.62 109.77 8155.13

111.96 8195.78106.7035 8209.88105.0564 8226.94

100.79 8260.85 96.48 8273.47 93.23 8293.34

84.6 8375.97 84 8388.59 83.29 8404.54

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109.19 8485.66 110.66 8505.14111.0707 8524.24

114.45 8548.37 114.3 8556.23 113.25 8560.16

112.21 8600.75 110.18 8620.39 108.99 8642.65

109.98 8735.63 109.61 8740.86 109.79 8767.05

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                                                        112.98 9514.81
113.33 9602.56
113.64 9677.22
    9500 4
                                                                                                                                                                 113 35
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10952.83 115.310963.31
11037.44116.243911043.19
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11253 28
                       117 1 11269 7
                                                        116 8311278 01
                                                                                           117 2811297 41
11319.58 121.12 11336.2 120.9611347.29
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                                                                                                                              119.5411377.77 119.62
         ing's n Values num= 4
Sta n Val Sta n Val Sta
0 .066 8241.92 .025 8458.05
                                                                                          n Val Sta
.06611162.38
                                                       Lengths: Left Channel Right
1056.67 1804.67 1796
                                   Right
                                                                                                                                  Coeff Contr. Expan.
Bank Sta: Lert Right Lengths: 1
8195.78 8543.13
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
8543.1311377.77 114.45 T
                                                        T
0
                                  Station=
                                                                                 Elevation= 131.92
                                                                           Elevation= 131.92
Elevation=125.2567
                                  Station=11173.29
Right Levee
Blocked Obstructions num=
Sta L Sta R Elev
      Sta L Sta R Elev
0 1925.23 109.31
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
Description: RGV-03.
Station Elevation Data
                                                                                               Elev
      Sta Elev
0 131.79
46.65 122.87
                                       Sta
                                                          Elev
                                                                               Sta
                                                       131.73
120.3
112.8
                                                                           13.54
90.28
                                                                                                          22.57 129.08
103.82 115.97
                                                                                                                                              33.93 125.87
159.05 116.15
                                           8.48
                                                                                         131.11
                                         63.62
                                                                                           116.81
                    122.87 63.62

115.82 173.89

113.66 302.42

111.71 406.22

107.93 496.5

106.92 689.2
                                                                                          112.73 182.37
113.62 358.38
    163.29
                                                                        178.14
                                                                                                                              113 89
                                                                                                                                              209.94
                                                                                                                                                                113 57
                                                        113.54
111.02
                                                                         343.54
424.29
                                                                                           106.55
                                                                                                             437.83
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    455.88
678.6
                                                        107.1
                                                                          618.37
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                                                                                                             649.97
710.41
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                                                                                                                              108.33
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105.44
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810.08
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1384.76
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110.18 4847.88 110.34 4900.91
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5275.73

109.49 4962.68

109.78 5348.78

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8190.46
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                 112.13 9156.51
                 112.55 9268.94
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111.51 9755.37
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10085.78
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10214 27
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10939 31
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121.47 11518.7
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                                                                                                  125.8711430.33
                                                                                                                              125.07
11437.22 126.3311441.81
11478 121.9411482.52
                                             126.311455.38
122.511505.31
                                                                                                   123.211473.47
                                                                                                  121.4211525.48
11541 32 123 1211564 57 123 5111572 98
                                                                        123 311591 07
                                                                                                  122 34 11606 9 122 67
Manning's n Values
                                            num=
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2.07 .025 6711.77
       Sta n Val Sta
0 .066 6462.07
                                                                         .06610966.85
Bank Sta: Left
                                            Lengths: Left Channel
                                                                                                      Coeff Contr. Expan.
6436.26 6830.02 1056

Ineffective Flow num= 1

Sta L Sta R Elev Permanent
                                             1056.67 1804.67
1
 6830.02 11606.9 114.17
                                           T
0
Left Levee Station= 0
Right Levee Station=11437.43
                                                           Elevation= 131.79
Elevation=126.3733
Blocked Obstructions num=
    Sta L Sta R Elev
0 1530.13 112.26
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                            RS: 172
TNPIIT
Description: RGV-03, New Cross-section, Bathymetric elevations translated from
                     IBWC 2008 Cross-sections
Station Elevation Data
                                         num=
      Sta Elev
0 131.67
55.61 117.23
                                  Sta
                            9.84
75.45
                                              Elev
                                                              Sta
                                           131.9
                                                        16.4
104.97
                                                                      131.27 22.96
116.21 170.58
                                                                                                 129.6
116.16
                                                                                                              45.93 122.45
196.82 116.26
                                           116.2
105.04
108.65
                                                        262.43
321.48
482.22
                                                                      116.44 288.67
105.55 331.32
109.3 488.78
   219.79 116.11 252.59
308.36 108.17 318.2
                                                                                                  115.9
110.24
                                                                                                                295.23
                                                                                                                             114 87
                  108.5 472.38
   449.41
                                                                                                  108.63
                                                                                                                505.18
                                                                                                                             108.68
                109.17
                             534.7
967.71
                                                                       108.87 547.82
103.93 1007.08
                                             110.1
                                                         541.26
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   574.07
                                            103.32
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 1046.44
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108.67 1112.05
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113.58 1118.61
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114.13 1148.13
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114.38 1167.82
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109.11 1486.01
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                                                                       108.96 2995
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109.89 3280.4
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3280.4 109.74 3300.08
 3237.75
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110.18 3710.13 110.26 3749.5
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110.63 3808.55 110.42 3897.12 110.56 3913.52 110.42 3959.45 110.43 110.63 4051.29 110.41 4077.52 110.59 4100 47 110 4 4107.03 110.59
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78.91 4760.21
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78.31 4770.21
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79.31 4830.21

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87.31 4880.21

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112.97 6762.86
114.76 6851.39
                        108.18 6215.3
106.59 6339.9
                                                             108.2 6257.93
106.46 6346.46
                                                                                                                                                                                106.5
    6189.07
    6320.23
                                                              107.06 6448.1
107.32 6575.97
                        107.23 6441.54
107.38 6562.86
    6415.31
                                                                                                  107.03 6592.37
106.49 6684.17
111.44 6753.03
114.22 6818.6
112.91 6900.57
112.48 6995.67
112.67 7100.62
                                                             106.45 6664.5
109.66 6743.19
114.65 6805.49
                        106.78 6648.11
107.14 6736.63
    6625.15
    6769.42
                         112.95 6798.93
                        113.41 6874.34
113.61 6943.2
114.43 7038.31
111.57 7192.45
    6867.79
6933.36
                                                             113.7 6884.18
112.74 6953.04
                                                                                                                                        113.29 6913.69
113.89 7012.07
                                                             112.74 6953.04

113.2 7061.26

111.22 7228.52

110.81 7418.74

114.42 7494.17

112.34 7549.93

113.95 7677.83

113.66 7769.66
                                                                                                                                        112.04 7153.09
111.34 7317.07
    7021.91
                                                                                                                                                                              111.49
                                                                                                 112.67 7100.62
111.18 7271.16
109.77 7451.54
113.8 7504.01
111.92 7563.05
    7176.05
                                                                                                                                       111.34 7317.07
109.94 7464.66
111.87 7513.85
112.37 7586
113.92 7700.79
112.77 7809.02
112.72 7927.08
111.82 7995.96
                        110.54 7376.11
    7362.99
7477.78
                                                                                                                                                                              110.84
                       110.54 7376.11

113.59 7484.34

112.35 7540.09

114.07 7654.88

114 7749.99

112.56 7881.17

114.56 7940.2
    7523.69
                                                                                                                                                                              114.05
                                                                                                   114.09 7694.23
112.49 7792.62
    7628.64
     7717.19
                                                                                                  114.81 7913.97
112.08 7979.56
111.93 8130.42
                                                             112.81 7904.13
114.51 7956.6
    7868 05
                                                                                                                                                                              113 19
                        114.56 7940.2
111.78 8032.03
     7933.64
                                                              112.13 8061.55
    8015.64
                                                                                                                                         112.04 8136.98
                                                             111.74 8241.92
111.83 8402.61
111.74 8540.34
112.2 8655.12
                                                                                                  111.93 8130.42
112.02 8278
111.98 8419.01
112.21 8553.46
111.95 8678.07
                                                                                                                                        111.79 8317.35
111.74 8441.96
112.08 8579.69
112.21 8701.03
                        112.11 8386.21
111.7 8500.99
111.84 8638.72
     8340.3
8451.8
                                                                                                                                                                              112.05
    8602.65
                        111.67 8838.76 111.76 8920.74
111.56 9028.96 111.36 9078.14
110.89 9228.99 110.6 9258.51
112.11 9320.81 113.01 9333.93
                                                                                                 111.44 8937.13 111.62 8953.53
111.35 9153.57 111.18 9183.08
111 9271.62 110.4 9278.18
112.51 9360.16 112.27 9373.28
    8828.92
           9006
                                                                                                111.35 9153.57 111.18 9183.08 110.81 111 9271.62 110.4 9278.18 110.54 112.51 9360.16 112.27 9373.28 111.6 112.33 9550.36 112.37 9576.6 112.21 112.59 9720.89 112.35 9747.12 112.61 112.59 9838.94 112.91 9848.78 112.38 112.21 9973.39 112.54 9983.23 112.38 112.6810137.36 112.4310166.87 112.54 112.6710232.46 112.301255.41 112.61 112.8310353.79 112.610370.19 112.92 112.910547.27 112.3910557.11 112.85
    9199.48
                                                             112.12 9497.89 112.33 9505.16
112.45 9714.33 112.59 9720.89
112.62 9802.87 112.59 9838.94
112.13 9953.72 112.21 9973.39
112.3110107.84 112.6810137.36
                        112.55 9465.1
112.47 9629.07
112.28 9786.47
    9402.79
    9770.08
                        112.43 9901.25
112.6410075.05
    9878 29
  10006.19
  10176.71 112.910189.83
10301.32 112.7510311.16
10435.77 112.8310468.57
                                                             112.2810199.66
112.5210324.28
                                                             112.6410491.52
                        112.8310408.57 112.6410491.52 112.510603.02 112.7910622.69 112.1610714.51 115.9310737.47 113.39 10780.1 114.9910806.33 119.5410921.11 119.7610940.79 121.3611029.33 121.7911088.35 120.3111186.73 118.7311193.29
                                                                                                 112.5910547.27
112.5910655.49
115.7810744.03
                                                                                                                                         112.6510688.28
                                                                                                                                        113.9810753.87
117.8310852.24
120.6710989.97
  10698.12
                                                                                                                                                                              113.34
                                                                                                 116.510822.73
120.44 10970.3
  10894.88
                                                                                                  121.6211137.54
118.2811252.32
                                                                                                                                        120.5111150.66
117.5911271.99
  11012 93
  11331.02
                        116.6911344.14
                                                              116.6311393.33
                                                                                                   117.1211403.17
                                                                                                                                         116.6411419.56
                                                                                                                                                                                 116.7
                                                             115.7611478.59
117.0811590.09
                                                                                                  115.9711501.54
117.6211609.76
                                                                                                                                        116.5211527.78
117.911642.55
                         116.0111455.63
  11547.46 116.6911576.97
  11655.67 119.5411662.23
11701.58 127.4911708.14
                                                             120.911672.07
127.38 11714.7
                                                                                                  126.2111675.35
126.2811737.65
                                                                                                                                        127.0311691.74 125.68
126.9911757.33 125.84
  11777.01 126.1511786.84 125.6811803.24 125.9111822.92
                                                                                                                                         125.1111836.03 125.73
                                                             num=
 Manning's n Values
            Sta n Val Sta n Val Sta n Val
0 .066 4697.21 .025 5071 .066
                                                                                                     .06611029.33
                                                                                                                                             .085
Bank Sta: Left Right Lengths: Left Channel Right
4697.21 5116.9 2737 1911 1305.5

Ineffective Flow num= 1
Sta L Sta R Elev Permanent
5116.911836.03 113.88 T

Left Levee Station= 9.84 Elevation= 131.9
Right Levee Station=11701.58 Elevation= 127.49

Blocked Obstructions num= 1
Sta L Sta R Elev
1 1000 03 108.67
                                                                                                                                             Coeff Contr. Expan.
        Sta L Sta R Elev
0 1098.93 108.67
 CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft) 128.84

Vel Head (ft) 0.08

W.S. Elev (ft) 128.77

Crit W.S. (ft) 115.89

E.G. Slope (ft/ft) 0.000044

Q Total (cfs) 235000.00

Top Width (ft) 11810.39

Vel Total (ft/s) 1.20

Max Chl Dpth (ft) 52.46

Conv. Total (cfs)
                                                                                                                                                                                                        Right OB
                                                                                          Wt. n-Val.
                                                                                                                                                         0.066
                                                                                                                                                                                   0.026
                                                                                                                                                                                                            0.067
                                                                                                                                                                           1911.00
14572.88
                                                                                                                                                                                                        1305.50
                                                                                         Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                                                  2737.00
88163.43
                                                                                         Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                                                  88163.43
                                                                                                                                                                           14572.88
                                                                                                                                                                                                      109756 20
                                                                                                                                                                              60162.10
                                                                                                                                                    4671.57
                                                                                                                                                                                 419.69
                                                                                                                                                                                                        6719.13
                                                                                                                                                         18.87
                                                                                                                                                                                                            13.94
                                                                                                                                                                                  34.72
      Conv. Total (cfs)
Length Wtd. (ft)
                                                             35257630.0
1933.81
                                                                                          Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                       14050900.0
                                                                                                                                                                                     9026268.0
                                                                                                                                                                                                                12180470.0
                                                                                                                                                                               430.04
                                                                                                                                                     4681.04
      Min Ch El (ft)
                                                                                                                                                    0.05
                                                                                                                                                                                0.09
                                                                                          Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                     76.31
                                                                                                                                                                                                               0.04
                                                                                                                                                 0.06
199903.40 74459.6
37 16 3000.43
                                                                       3.54
                                                                                                                                                                                                               0.03
      Alpha
      Frctn Loss (ft)
                                                                       0.12
                                                                                          Cum Volume (acre-ft)
                                                                                                                                                                              74459.67
                                                                                                                                                                                                        232245.40
                                                                                                                                                                                                   26660.61
                                                                                          Cum SA (acres)
```

Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 171.90 REACH: Lower Reach

| Descripti
Station E | | | num= | 460 | | | | | |
|--------------------------|-------------------|----------------------|--------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|
| Station E
Sta | Elev
126.32 | Sta
10.79 | | Sta
26.98 | Elev
128.22 | Sta
44.96 | Elev
130.95 | Sta
53.95 | Elev
131.54 |
| 61.79 | 130.4 | 75.51 | 126.83 | 87.27 | 124.17 | 93.15 | 123.42 | 104.04 | 123.33 |
| 154.09
232.32 | 120.58
114.32 | 194.16
238.2 | 118.89
112.75 | 204.88
246.04 | 118.87
115.4 | 220.56
263.68 | 118.36
114.74 | 224.48
314.3 | 117.79
114.04 |
| 340.13
391.09 | 114.25
111.14 | 363.65
404.43 | 114.68
110.84 | 367.57
434.48 | 115.07
110.78 | 371.49
504.57 | 114.37
110.93 | 381.29
626.3 | 111.71
110.81 |
| 640.03
704.71 | 111.07
113.26 | 673.35
712.55 | 110.7
115.63 | 679.23
716.47 | 111.05
115.87 | 685.11
734.11 | 110.77
115.8 | 694.91
745.88 | 110.97
113.33 |
| 759.6 | 112.92 | 774.94 | 112.74 | 814.98 | 111.51 | 845.03 | 110.98 | 912.48 | 110.85 |
| 925.35
1106.54 | 110.69
110.65 | 939.65 | 110.8753
110.72 | 977.17
1186.41 | 110.92
110.66 | 992.85
1236.62 | | 1020.29
1316.27 | 110.87
110.13 |
| 1326.07
1371.15 | 109.94
109.86 | 1339.8
1398.6 | | 1347.63
1435.84 | 107.46
109.71 | 1355.47
1467.2 | | 1363.31
1502.48 | 110.08
109.77 |
| 1526.01
1688.49 | | 1573.05
1738.7 | 110.13 | 1598.13
1755.35 | 110.08 | 1618.14
1837.67 | 110.2 | 1648.34
1847.47 | 110.57
109.28 |
| 1899.38 | 108.55 | 1916.08 | 108.17 | 1955.28 | 108.1 | 1965.08 | 108.3 | 1974.88 | 106.49 |
| 1982.72
2050 | | 1990.56
2151.29 | | 1996.44
2172.85 | 108.44
108.38 | 2008.2
2208.14 | 108.33
108.52 | 2027.8 2219.9 | 108.56
108.39 |
| 2260.85
2468.83 | 108.35 | 2308.1
2502.14 | | 2323.79
2542.01 | 108.44
108.54 | 2413.95
2562.1 | | 2435.51
2617.73 | 108.64
108.3 |
| 2672.57 | 108.54 | 2702.68 | 109.02 | 2745.07 | 109.1 | 2754.87 | 109.63 | 2772.98 | 109.8 |
| 2819.53
2870.29 | 99.6 | | 96.80185 | | 88.24 | 2854.313
2897.11 | 83.64 | 2906.36 | 104.57
80.46 |
| 2915.6
2961.1 | | 2924.85
2980.53 | 78.16
79.95 | 2934.1
3004.82 | 76.31
82.88 | 2944.1
3020.6 | 76.31
85.28 | 2952.6
3029.1 | 77.16
86.81 |
| 3054.6
3202.41 | | 3065.53
3207.99 | 92.22
105.4 | 3097.1
3227.5 | 97.11
104.38 | 3138.39 | | 3162.68
3256.57 | 102.97 |
| 3272.1 | 104.57 | 3288.83 | 104.88 | 3297.21 | 105.66 | 3300.6 | 106.455 | 3308.34 | 108.27 |
| 3330.64
3387.38 | | 3344.58
3397.71 | | 3352.94
3418.36 | 112.97 | 3366.72
3428.69 | | 3380.49
3442.46 | 111.26
109.69 |
| 3462.5
3566.41 | | 3468.77
3578.32 | | 3504.43
3590.85 | 107.56
108.41 | 3538.86
3600.24 | 107.48
108.23 | 3556.41
3614.6 | 107.56
108.53 |
| 3644.06 | 108.78 | 3653.45 | 108.67 | 3669.11 | 109.25 | 3678.49 | 109.26 | 3725.45 | 110.21 |
| 3775.54
3872.57 | | 3896.92 | 109.72 | 3816.23
3916.4 | 110.18
109.82 | 3838.14
3957.1 | 109.43 | 3850.67
3997.79 | 109.7
109.15 |
| 4025.96
4127.59 | | 4047.87
4148.05 | | 4072.92
4157.44 | | 4094.83
4173.08 | | 4107.35
4204.39 | 108.64
109.74 |
| 4213.78
4358.26 | 109.72 | 4226.31 | 110.17 | 4267
4392.21 | 110.42 | 4279.52 | 110.61 | 4344.5 | 110.42 |
| 4470.47 | 110.47 | 4373.43
4478.76 | 110.23 | 4506.31 | 110.31 | 4409.91
4536.21 | 109.67 | 4429.77
4551.07 | 110.79
109.55 |
| 4571.72
4664.54 | 109.68 | 4585.5
4677.07 | | 4616.49
4695.85 | | 4637.14
4708.37 | 109.64
109.01 | 4648.9
4720.9 | 109.85
107.07 |
| 4727.15
4824.2 | 107.59 | 4752.2
4855.49 | 107.28 | 4777.24
4874.28 | 108.38 | 4792.89
4902.24 | 108.36 | 4802.28
4927.49 | 109.45
109.23 |
| 4936.66 | 109.36 | 4958.8 | 109.27 | 4971.31 | 109.47 | 4986.97 | 109.17 | 5019.3 | 109.09 |
| 5039.96
5088.15 | | 5053.72
5119.14 | | 5060.61
5126.03 | | 5070.94
5137.23 | | 5081.26
5146.62 | 112.76
113.18 |
| 5191.45
5280.96 | | 5208.66
5296.87 | | 5225.87
5325.72 | 112.69 | | 112.33 | 5260.3
5353.28 | 112.76
113.52 |
| 5368.87 | 113.4 | 5384.52 | 112.95 | 5406.43 | 113.01 | 5425.21 | 112.54 | 5437.74 | 112.72 |
| 5462.77
5534.77 | | 5478.43
5556.69 | | 5494.08
5584.86 | | 5509.74
5628.69 | | 5522.25
5663.12 | 109.45
111.15 |
| 5694.43
5803.99 | | 5711.42
5818.18 | | 5747.64
5838.85 | | 5769.96
5849.17 | | 5791.46
5869.83 | 111.49
111.65 |
| 5880.17 | 112.59 | 5897.39 | 112.59 | 5907.72 | 112.37 | 5921.49 | 112.58 | 5945.59 | 113.45 |
| 5969.89
6113.88 | 112.63 | 6013.71
6138.44 | 111.85 | 6026.23
6148.32 | 111.77 | 6059.24
6179.77 | 111.98 | 6066.13
6210.92 | 113.19
112.46 |
| 6223.44
6289.97 | | 6232.83
6303.74 | | 6239.09
6310.63 | | 6255.53
6317.52 | | 6279.64
6334.74 | 113.08
111.55 |
| 6358.85
6483.26 | 111.28 | 6376.07
6511.42 | 111.35 | 6396.73
6524.14 | 111.19 | 6413.94
6562.03 | 111.33 | 6444.94
6580.29 | 111.08
111.04 |
| 6595.95 | 111.62 | 6602.21 | 111.42 | 6630.38 | 111.86 | 6639.77 | 112.19 | 6658.55 | 111.7 |
| 6672.22
6906.37 | | 6737.64
6930.88 | | 6820.28
6989.01 | | 6844.38
7013.11 | | 6862.02
7043.58 | 111.47
111.61 |
| 7068.21
7275.22 | | 7092.31
7290.86 | | 7116.42
7309.65 | | 7212.61
7364.33 | | 7250.71
7412.94 | 111.09
111.27 |
| 7425.47 | 111.37 | 7497.47 | 111.26 | 7535.03 | 111.13 | 7591.6 | 111.14 | 7622.59 | 110.89 |
| 7639.81
7767.21 | 112.17 | 7670.79
7780.98 | 111.89 | 7701.79
7808.53 | 111.83 | | 111.49 | 7743.11
7853.29 | 111.72
111.94 |
| 7879.36
8046.13 | 111.74
111.89 | 7901.27
8076.57 | | 7918.72
8132.91 | | 7970.13
8154.82 | | 8035.8
8180.42 | 111.76
111.83 |
| 8187.31
8311.27 | 111.71 | 8214.85
8321.6 | 111.78 | 8238.96
8336.38 | 111.61 | | 111.86 | 8276.9
8452.44 | |
| 8462.78 | 111.55 | 8492.89 | 111.75 | 8511.67 | 112.04 | 8524.2 | 111.98 | 8533.58 | 112.33 |
| 8558.63
8679.71 | 112.26 | 8593.62
8690.03 | 112.42 | 8611.84
8724.48 | | 8646.27
8733.92 | | 8665.94
8765.22 | 112.61
112.67 |
| 8807.11
8956.17 | | 8840.35
8971.83 | | 8851.88
8996.5 | | 8896.7
9043.82 | | 8912.35
9065.37 | 112.58
112.57 |
| 9075.12 | 112.27 | 9100.16 | 112.59 | 9140.86 | 112.5 | 9156.51 | 112.14 | 9169.03 | 113.44 |
| 9178.42
9271.98 | 114.22 | 9197.21
9292.63 | 114.3 | 9213.44
9299.52 | 115.19 | 9230.65
9322.42 | 116.71 | 9254.75
9344.28 | 115.43
118.62 |
| 9419.46
9591.62 | 120.9
123.31 | 9447.58
9621.96 | 121.24
123.1679 | 9475.8
9641.71 | 121.97
122.75 | 9525.88
9657.36 | | 9561.22
9674.84 | 122.97
122.35 |
| 9688.62
9829.52 | 122.48 | 9716.16
9851.42 | 121.66 | | 120.54 | 9735.61
9926.55 | 120 | 9795.37
9943.43 | 119.11
118.44 |
| 9953.77 | 118.17 | 9970.97 | 118.23 | 9986.02 | 1183 | 10011.06 | 118.43 | 10045.49 | 119.44 |
| 10073.66
10139.4 | | 10079.92
10151.92 | | 10098.71 | | 10123.75
10186.35 | | 10130.01
10205.12 | 120.18
119.53 |
| 10218.9
10267.73 | | | | 10236.12
10281.17 | | 10239.56
10290.73 | | 10256.77
10302.7 | 126.18
127.06 |
| 10320.91 | 127.14 | 10352.2 | 126.27 | 10374.46 | 126.483 | 10393.59 | 125.82 | 10412.73 | 124.49 |
| 10419.9 | 124.41 | 10427.08 | 124.93. | 10441.43 | 123.49. | 10462.96 | 123.43. | 104//.31 | 123.84 |
| Manning's
Sta | n Value
n Val | | num=
n Val | 5
Sta | n Val | Sta | n Val | | |
| 0 | .081 | | .066 | | .015 | | | 3352.94 | |
| Bank Sta:
28 | | Right
352.94 | Length | s: Left (
2737 | Channel
1911 | Right
1305.5 | Coefi | E Contr. | Expan. |
| 28
Ineffecti
Sta L | ve Flow | num:
Elev | = :
Perman | l
ent | | | | | |
| 0 | 2833.24 | 109.92 | T | | | 121 51 | | | |
| Left Leve
Right Lev | ree S | station= | 53.95 | Ele
Ele
1 | evation= | 127.7 | | | |
| Blocked O
Sta L | bstructi
Sta R | | | 1 | | | | | |
| 3359.72 | | | | | | | | | |

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 171.8

Description: RGV-03, Bathymetric elevations translated from IBWC 2008 Cross-sections Station Elevation Data Sta 19.61 81.72 143.83 Sta Elev 0 120.98 Sta 121.23 26.15 98.06 121.71 131.18 39.23 123.71 107.87 131.22 163.44 120.67 49.03 114.41 124.66 130.75 124.98 121.61 156.9 120.42 183.05 120.19 212.47 118.36 117.85 222.28 199.4 118.24 245.16 118.55 287.66 118 28 116.35 304 346.49 113.9 356.3 112.77 372.68 438.24 112.59 112.06 382.52 467.74 112.23 111.97 389.07 484.13 112.65 111.3 405.46 503.8 112.34 110.97 418.57 592.3 667.7 726.7 602.14 677.53 749.65 110.92 111.85 111.45 110.69 111.38 110.39 618.53 687.36 631.64 700.48 572.64 112.07 648.03 710.31 106.98 107.1 106.67 798.81 106.67 818.48 857.82 952.88 106.48 106.61 893.88 962.71 106.84 910.26 972.55 106.56 108.04 916.82 985.66 106.73 933.21 109.26 1005.33 1015.16 1057.99 108.56 1021.72 84.81 1067.99 105.16 1028.99 80.91 1077.99 103.29 1037.99 78.91 1087.99 96.81 1047.99 78.31 1097.99 76.31 1117.99 85.71 1197.99 77.31 1127.99 87.31 1207.99 79.31 1137.99 89.31 1217.99 1107.99 79.31 1157.99 81.31 103.29 1331.99 106.47 1441.41 104.68 1503.72 1257.99 96.31 1267.99 98.31 1287.99 101.71 1315.99 103.81 104.76 1411.89 104.61 1464.36 105.09 1520.12 1405.33 105.02 1418.45 105.21 1480.76 107.2 1428.29 105.05 1493.88 105.77 1529.95 111.35 1579.15 1513 56 108.13 1536.51 108.54 1543.07 111.39 1588.99 112.07 1598.82 1552.91 109 1562.75 111.69 111.85 1634.9 110.67 1710.33 110.89 1680.81 110.73 1746.4 110.07 1838.23 111.06 1654.58 110.94 1720.17 111.47 1670.97 110.61 1739.84 1605.38 111.42 1769.36 110.52 1802.15 110.12 1811.99 110.42 1825.11 110.88 110.32 1802.15 110.29 1877.58 110.42 1979.25 111.53 2084.19 111.61 2179.3 110.1 1893.98 110.8 1992.36 110.34 1903.82 110.45 2031.72 112.11 2110.43 111.17 2221.93 110.07 1636.23 110 1920.22 110.83 2051.4 111.32 2133.38 111.3 2248.17 1930.05 112.06 2097.31 111.8 2208.81 2074.35 111 92 2166.18 110.44 2294.08 109.35 2343.27 2264.56 110.29 2317.03 109.08 2359.67 108.4 2379.35 108.49 2474.45 109.92 2546.6 112.5 2658.1 107.65 2421.98 108.32 2431.82 109.16 2490.85 111.43 2599.07 112.71 2687.62 108.63 2481.01 110.82 2559.72 112.29 2677.78 109.28 2503.97 111.94 2631.87 112.42 2717.13 2448.21 109.88 2513.8 2648.26 112.24 2759.77 112.37 2881.11 112.55 2766.32 112.35 2920.46 112.27 2792.56 112.77 2946.7 112.48 2828.64 112.87 2963.09 2743.37 111.48 3002.45 107.22 3081.16 111.61 3009.01 109.36 3090.99 110.82 3022.13 108.96 3097.55 2976 21 107 34 2995 89 108.02 3054.92 111.66 3120.51 112.15 3238.57 112.07 3369.75 111.81 3130.35 111.89 3271.37 111.51 3392.71 3107.39 112.26 3163.14 112.5 3182.82 111.89 112.07 3284.48 112.46 3300.88 111.75 3415.66 111.42 3435.34 3314 111.41 3448.46 111.66 3458.3 111.76 3537.01 111.69 3625.55 112.2 3468.14 112.32 3553.4 111.8 3494.37 112.06 3569.8 111.99 3504.21 111.51 3592.76 3523.89 112.32 3671.46 112.88 3773.13 107.96 3861.67 112.4 3661.63 113.54 3760.01 3605 87 111.91 3700.98 113 3740.33 112.86 3832.16 113.42 3799.36 107.47 3874.79 111.4 3848.56 107.79 3815.76 107.47 3874.79 108.05 3937.1 111.61 4068.28 112.79 4143.71 112.76 4330.64 112 4481.49 111.02 4583.16 111.76 4635.63 107.39 3914.15 109.93 4009.25 107.96 3927.26 111.08 4042.05 108.96 3973.18 3953.5 111.52 112.5 4110.92 112.41 4238.81 112.55 4429.02 111.27 4517.57 4081.4 111.72 114.27 4097.8 4192.9 112.8 4133.87 112.86 4294.56 4156.83 111.89 4451.98 110.97 4530.69 112.71 4622.51 4376 55 112.37 4389.67 111.21 4504.45 113.02 4606.11 4596.27 112.1 4612.67 111.02 4740.57 110.37 4907.82 110.72 4806.16 110.17 4963.57 110.5 4822.56 110.17 4970.13 110.25 4868.47 110.37 4986.53 4897.98 111.52 112.4 5039 111.24 5337.43 111.09 5465.33 110.71 5622.74 111.1 5006.2 111.53 5193.13 111.6 5022.6 111.5 5235.77 111.76 5032.44 111.44 5265.28 4993.09 5052.12 5347.27 5485 111.17 5393.18 111.02 5540.75 110.97 5429.25 110.81 5566.99 110.91 5455.49 110.61 5580.11 110.88 5632.58 110.43 5655.53 110.62 5671.93 110.51 5691.61 110.85 5698.17 110.62 5671.93 110.69 5734.24 111.04 5904.77 111.21 5996.6 111 6199.92 111.36 5730.96 111.21 5871.98 110.89 5776.87 111.19 5921.17 5855.58 110.94 5931.01 110.96 5990.04 111.08 6131.05 111.03 6042.51 111.39 6232.72 110.96 5970.36 111.14 6062.19 6104.82 111.26 6265.51 111.44 6285.19 6386.85 111.21 6308.14 111.38 6426.2 111.37 6331.1 111.36 6449.16 111.11 6354.06 111.17 6455.72 111.41 6373.73 111.3 6531.15 111 09 6537.71 111.15 6596.74 111.15 6619.69 110 96 6649 21 6698 4 110 87 111.13 6330.74 111.14 6747.59 111.15 6829.58 111.02 6767.27 110.92 6859.09 111.15 6777.11 111.07 6875.49 110.81 6901.72 6809.9 6908.28 7006.67 110.8 6950.92 111.5 7016.5 110.69 6957.47 112.24 7029.62 110.93 6973.87 112.33 7042.74 110.89 6993.55 112.87 7088.65 112.3 111.9 7150.96 112.73 7252.62 112.31 7337.89 112.75 7475.63 112.02 7610.08 112.04 7134.56 112.39 7226.39 112.64 7324.77 112.35 7190.32 112.45 7259.18 112.57 7367.41 112.11 7196.87 112.68 7278.86 7098.49 112.3 7396.92 112.47 7551.05 7298 54 112 48 112.57 7367.41 112.56 7528.1 112.49 7633.04 115.2 7711.75 114.58 7767.5 7413.32 112.04 7324.77 112.29 7459.23 112.44 7583.85 112.23 7652.72 7567.45 112.39 7669.11 7734.7 111.66 7682.23 113.16 7751.1 114.22 7692.07 113.41 7760.94 114.95 7721.59 114.66 7780.62 115.86 7790.45 115.08 7803.57 119.29 7924.91 114.99 7823.25 121.43 7944.59 115.5 7842.93 122.27 7987.22 117.18 7849.48 122.92 8003.62 124.27 8072.49 124.36 8177.43 123 8275.81 123.67 8042.97 124.92 8151.19 124.15 8056.09 124.92 8164.31 8026.57 124.05 8095.44 124.28 8193.83 8216.78 124.09 8239.74 123.26 8256.13 121.74 8318.44 120.9 120.09 8439.77 120.01 8547.99 119.61 8475.85 120.59 8564.39 120.49 8374.19 120.53 8397.14 119.69 8521.76 119.74 8538.15 8502.08 8570.95 121.61 8580.78 121.67 8656.21 121.73 8600.46 121.5 8682.44 122.62 8613.58 121.82 8689 121.8 8629.97 123.36 8698.84 121.25 120.32 8748.03 121.18 8738.19 122.35 8800.5 8708.68 122.14 8711.96 120.94 8754.59 120.73 121.1 125.89 8807.05 126.62 8816.89 8826.73 126.5 8833.29 127.86 8839.85 127.91 8849.69 127.01 8856.24 127.46 127.11 127.49 8898.88 125.79 9030.05 127.37 8938.23 123.18 9039.88 126.89 9003.81 8977.58 122.94 9049.72 9062.84 122.56 9069.4 121.49 9089.07 122.07 9098.91 121.56 9118.59 Sta n Val Sta 0 .081 107.87 Sta n Val Sta .066 1028.99 .015 1480.76 .066 1588.99 Lengths: Left Channel Right Bank Sta: Left Right Coeff Contr. Expan. Bank Sta: Left Right Lengths: Left
1005.33 1588.99 1869.27
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1005.33 109.18 T 1625 951.28

```
Lert Levee Station=107.8701 Elevation= 131.22
Right Levee Station= 8839.85 Elevation= 127.91
Blocked Obstructions num= 1
Sta L Sta R Elev
1588.99 9118.59 112.07
```

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 128.56 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|---------------|
| Vel Head (ft) | 0.13 | Wt. n-Val. | 0.066 | 0.030 | 0.067 |
| W.S. Elev (ft) | 128.43 | Reach Len. (ft) | 1869.27 | 1625.00 | 951.28 |
| Crit W.S. (ft) | 116.04 | Flow Area (sq ft) | 13948.97 | 18148.98 | 108311.40 |
| E.G. Slope (ft/ft) | 0.000089 | Area (sq ft) | 14630.09 | 18148.98 | 108311.40 |
| Q Total (cfs) | 235000.00 | Flow (cfs) | 18605.06 | 82434.13 | 133960.80 |
| Top Width (ft) | 8997.97 | Top Width (ft) | 884.71 | 583.66 | 7529.60 |
| Vel Total (ft/s) | 1.67 | Avg. Vel. (ft/s) | 1.33 | 4.54 | 1.24 |
| Max Chl Dpth (ft) | 52.12 | Hydr. Depth (ft) | 15.77 | 31.10 | 14.38 |
| Conv. Total (cfs) | 24902750.0 | Conv. (cfs) | 1971563.0 | 8735473 | .0 14195710.0 |
| Length Wtd. (ft) | 1249.08 | Wetted Per. (ft) | 886.78 | 594.55 | 7539.30 |
| Min Ch El (ft) | 76.31 | Shear (lb/sq ft) | 0.09 | 0.17 | 0.08 |
| Alpha | 2.95 | Stream Power (lb/ft s) | 0.12 | 0.77 | 0.10 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 193561.90 | 73000.90 | 225956.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 23377.88 | 2955.62 | 26233.57 |
| | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 171.48* REACH: Lower Reach

| INPUT | | | | | | | | | |
|--------------------|-----------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| Descripti | | | | | | | | | |
| Station E | | | num= | 460 | | . | | | |
| Sta
0 | Elev
121.53 | Sta
20.46 | Elev
122.12 | Sta
30.69 | Elev | | Elev
122.57 | Sta
64.79 | Elev
124.25 |
| 68.21 | 121.53 | 75.02 | 127.02 | 85.25 | 121.82
129.43 | | 122.57 | 109.01 | 129.29 |
| 138.92 | 122.94 | 152.2 | 121.42 | 158.85 | 121.08 | | 119.29 | 195.4 | 118.89 |
| 208.68 | 117.59 | 218.65 | 117.3 | 285.11 | 117.02 | 301.71 | 116.59 | 308.36 | 116.72 |
| 331.62 | 115.92 | 336.481 | | 354.87 | 114.1 | 371.52 | 113.99 | 381.52 | 113.67 |
| 392.43 | 113.68 | 431.11 | 112.08 | 453.67 | 111.48 | 468.14 | 111.34 | 484.8 | 110.87 |
| 504.79 | 110.63 | 534.24 | 110.51 | 574.76 | 110.58 | 594.74 | 110.78 | 604.74 | 110.71 |
| 621.4 | 111.09 | 634.73 | 110.74 | 651.39 | 111.04 | 681.37 | 110.31 | 691.36 | 109.72 |
| 704.7 | 109.25 | 714.69 | 108.66 | 731.35 | 108.7 | 769.53 | 108.44 | 782.42 | 108.57 |
| 824.63
927.49 | 108.59
108.4 | 843.66
941.25 | 108.77
108.17 | 875.9
961.24 | 108.7
108.4 | 895.25
981.23 | 108.27
109.1 | 917.92
994.56 | 108.24
109.77 |
| 1014.55 | 110 | 1022.8 | 107.59 | 1026.7 | | 1034.621 | | | 102.81 |
| 1058.869 | | | | 1091.99 | | 1100.52 | | 1109.76 | 76.53 |
| 1116.71 | 76.14 | 1129.07 | 75.01 | 1134.07 | 75.01 | 1141.88 | 75.72 | 1149.69 | 76.93 |
| 1157.49 | | 1173.11 | 79.1 | 1204.34 | 83.35 | 1212.15 | | 1235.57 | 87.39 |
| 1260.59 | | 1274.61 | | 1291.18 | | 1308.96 | | 1337.07 | 99.6 |
| 1352.36 | | 1371.35 | 101.61 | 1376.47 | 102.9 | 1387.71 | | 1394.4 | 102.41 |
| 1412.32
1477.49 | 103.2 | 1417.821
1477.7 | | 1450.73 | | 1455.85
1491.38 | 103.75
109.17 | 1463.53
1501.94 | 105.06
109.45 |
| 1509.62 | 109.97 | | | 1552.54 | | 1576.65 | 109.17 | 1583.7 | 109.43 |
| 1590.76 | | 1616.91 | | 1622.51 | | 1633.08 | | 1650.62 | 108.96 |
| 1664.83 | | 1675.41 | | 1682.47 | | 1707.15 | | 1718.06 | 107.79 |
| 1730.32 | | 1742.58 | | 1751.78 | | 1794.69 | | 1803.89 | 107.61 |
| 1819.21 | | 1837.66 | | 1869.41 | | 1886.64 | | 1897.63 | 108.84 |
| 1911.74 | | 1941.82 | | 1963.28 | | 1972.47 | | 1985.81 | 110.63 |
| 1997
2141.06 | | 2018.45 | | 2049.11 2186.86 | | 2061.37 | | 2088.95
2229.17 | 108.63
108.43 |
| 2248.35 | | 2179.81
2272.87 | | 2288.19 | 109.04 | 2214.63
2297.39 | | 2312.71 | 108.43 |
| 2337.24 | | 2343.37 | 109.16 | 2364.83 | 109.56 | 2404.67 | | 2416.94 | 109.8 |
| 2454.83 | | 2483.05 | | 2493.61 | 110.63 | 2504.19 | | 2511.25 | 110.63 |
| 2521.83 | 110.47 | | 110.88 | 2539.46 | 110.1 | 2564.06 | 110.11 | 2588.59 | 109.79 |
| 2603.92 | | 2610.04 | | 2634.56 | 109.92 | 2668.29 | | 2705.17 | 110.05 |
| 2726.33
2824.61 | | 2743.96
2830.74 | 109.97 | 2778.63
2836.87 | 109.85 | 2793.95
2849.13 | | 2806.21
2855.26 | 107.02
107.39 |
| 2863.84 | | 2904.31 | | 2919.63 | | 2928.82 | | 2941.09 | 107.39 |
| 2980.93 | | 2999.33 | | 3026.04 | | 3043.66 | | 3057.77 | 108.96 |
| 3082.09 | 109.04 | 3094.34 | 109.24 | 3131.81 | 109.01 | 3152.97 | | 3181.17 | 108.78 |
| 3195.28 | | 3209.39 | | 3235.35 | | 3256.81 | | 3269.33 | 109.49 |
| 3279.91
3361 | | 3290.52 | 110.96 | 3308.11
3394.74 | 111.18 | 3322.21 | | 3330.38 | 111.33 |
| 3456.04 | | 3382.48
3483.63 | 111.23 | 3498.96 | 111.04 | 3413.13
3520.41 | | 3446.85
3540.82 | 111.43
111.49 |
| 3551.07 | | 3561.98 | 111.99 | | | 3590.92 | | 3606.24 | 110.96 |
| 3621.57 | 109.22 | 3667.55 | 108.92 | 3678.34 | 109.24 | | 109.18 | 3717.12 | 109.62 |
| 3727.7 | 109.49 | 3738.27 | 110.17 | 3752.38 | 110.52 | | 110.73 | 3794.69 | 110.53 |
| 3805.27 | 110.76 | 3826.94 | 110.56 | 3839.2 | 110.69 | | | 3879.31 | 111.34 |
| 3897.44
4013.3 | 111.28 | 3909.7
4020.35 | | 3918.09
4048.56 | | 3943.42
4069.71 | | 3986.33
4083.82 | 111.12 |
| 4115.07 | | 4129.65 | | 4164.11 | | 4200.17 | | 4228.38 | 109.94 |
| 4267.16 | | 4320.43 | | 4329.63 | | 4335.76 | | 4344.96 | 110.09 |
| 4471.67 | | 4492.83 | | 4524.57 | | 4552.77 | 109.17 | 4570.4 | 109.09 |
| 4584.51 | | 4595.08 | | 4609.19 | | 4619.76 | | 4637.39 | 109.21 |
| 4663.74 | | 4669.87 | 109.03 | 4685.2 | | 4691.33 | | 4703.58 | 109.73 |
| 4718.91
4848.95 | | 4728.11 | 109.98 | 4746.7
4912.42 | 109.68 | 4778.43
4972.36 | | 4796.06 | 109.48
109.18 |
| 4997.04 | 109.42 | 4859.53
5022.37 | 109.34 | | | 5081.67 | | 4979.41
5102.83 | 109.18 |
| 5141.61 | 109.5 | 5152.19 | | 5162.77 | | 5205.07 | | 5227.73 | 109.55 |
| 5254.44 | 109.73 | 5289.7 | | 5310.49 | | 5325.82 | | 5342.58 | 109.57 |
| 5360.22 | | 5380.99 | | 5448.37 | 110.04 | 5462.47 | | 5476.57 | 110.06 |
| 5512.8 | | 5550.62 | | 5558.77 | | 5578.83 | | 5631.71 | 109.81 |
| 5663.45 | | 5684.61 | | 5712.81 | | 5726.92 | | 5744.55 | 109.86 |
| 5755.13 | | 5779.81 | | 5797.44 | | 5804.49 | | 5839.75 | 110.39 |
| 5864.43
5952.58 | | 5885.59
5963.16 | | 5892.64
5981.77 | 110.39 | 5906.74
6023.1 | | 5934.95
6037.21 | 110.3
109.99 |
| 6072.46 | | 6086.57 | | 6100.67 | | 6118.31 | | 6195.87 | 109.84 |
| 6220.55 | | 6234.66 | | 6248.77 | | 6266.39 | | 6276.97 | 109.67 |
| 6305.18 | 109.75 | 6322.81 | 109.59 | 6333.39 | 109.95 | 6343.96 | 110.6 | 6368.65 | 111.2 |
| 6383.31 | | 6396.86 | | 6407.43 | | 6421.53 | | 6435.64 | 113.25 |
| 6439.16 | | 6446.22 | | 6460.32 | 111.9 | 6474.43 | | 6501.09 | |
| 6520.26 | | 6561.09 | | 6573.36 | 112.74 | 6582.54
6657.77 | | 6594.81 | 112.76
112.84 |
| 6607.07
6703.61 | | 6622.51
6721.24 | | 6640.14
6731.82 | 112.64 | 6760.03 | | 6675.41
6767.08 | 112.84 |
| 6791.76 | | 6809.37 | | 6834.07 | | 6855.23 | 114.13 | 6865.81 | 113.28 |
| 6876.39 | | 6897.54 | | 6908.11 | | 6929.27 | | 6943.38 | 113.34 |
| | | | | | | | | | |

```
113.99 7024.48
114.23 7137.34
115.84 7213.98
116.65 7296.74
115.6 7348.86
118.39 7426.43
119.74 7479.33
119.69 7567.47
120.13 7655.62
119.22 7741.19
118.88 7824.87
118.74 7902.45
120 7994.11
123.92 8075.28
125.72 8145.78
    6953.44 113.36 6999.79

7097.5 114.28 7112.83

7192.52 114.4 7204.78

7269.15 116.04 7278.35

7327.71 116.25 7338.28

7398.23 117.89 7415.85

7458.17 118.94 7468.75

7528.69 119.13 7539.27

7620.37 120.5 7643.1
                                                                                                                                                            113.91 7042.11 114.11 7080.89
114.54 7158.8 114.45 7177.2
116.51 7232.37 116.64 7253.67
117.12 7305.93 116.5 7320.66
116.1 7359.44 117.31 7373.37
119.04 7433.49 118.72 7447.59
                                                                                                                                                                                                                                                                                        114.66
115.89
                                                                                                                                                                                                                                                                                        116.13
                                                                                                                                                                                                                                                                                        119.58
                                                                                                                                                               119.97 7500.48
119.57 7578.05
                                                                                                                                                                                                                         119.41 7514.58
119.76 7595.68
   7528.69 119.13 7539.27 7620.37 120.5 7643.11 7708.51 119.43 7725.87 7786.08 118.85 7803.71 7877.76 118.98 7888.34 7946.55 119.96 7972.96 8044.63 123.24 8063.02 8115.13 124.72 8139.64 8191.75 126.39 8200.95 8274.51 130.99 8280.64 8338.85 131.37 8359.69 8397.88 129.9 8408.3
                                                                                                                                                              119.57 7578.05 119.76 7595.68 119.61 7682.96 119.83 7697.93 119.38 7759.58 118.96 7768.45 118.74 7851.53 118.98 7870.71 119.16 7909.5 119.72 7923.59 121.43 8015.27 121.85 8035.44 123.77 8090.6 123.88 8096.73 126.67 8154.97 127.1 8167.24
                                                                                                                                                                                                                                                                                        118.83
                                                                                                                                                                                                                                                                                        126.16
                                                                                               126.98 8234.66 128.04 8256.11 130.48 8265.31 131.8 8286.77 131.96 8291.98 131.51 8307.6 131.46 8373.57 130.9 8387.46 129.54 8392.67 128.6 8418.71 128.84 8423.92 128.56 8434.34
 Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .081 354.87 .066 1091.99
                                                                                                                                            Sta n Val Sta
1.99 .015 1481.45
.066 1633.08
                                                                                                                                                                                                                                   Coeff Contr.
                                                                                                                                                                                                                                                                                            Expan.
 CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 171.15

INPUT

| Descripti | on: RGV- | -04, Bath | ymetric | elevatio | ns trans | slated fr | om IBWC | 2008 | |
|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| | Cros | ss-sectio | ns | | | | | | |
| Station E
Sta | levation
Elev | | num=
Elev | 460 | Elev | Cto | Elev | Sta | Elev |
| 0 | 122.07 | Sta
6.45 | 122.55 | Sta
19.36 | 122.87 | Sta
29.04 | 120.99 | 35.5 | 120.47 |
| 61.31 | 120.51 | 64.54 | 121.14 | 70.99 | 124.41 | 80.67 | 128.25 | 96.86 | 128.47 |
| 113.23 | 127.41 | 126.33 | 125.7 | 132.88 | 124.43 | 162.36 | 120.37 | 172.18 | 119.24 |
| 188.56 | 117.75 | 211.48 | 116.45 | 234.41 | 115.86 | 260.61 | 115.72 | 276.98 | 115.79 |
| 316.28 | 115.52 | 371.96 | 115.38 | 391.61 | 114.78 | 430.91 | 112 | 453.84 | 110.95 |
| 493.14
683.09 | 110.32
110.23 | 535.71
712.57 | 110.19
110.36 | 581.56
742.04 | 110.24
110.28 | 611.04
764.97 | 110.01
110.41 | 637.24
774.79 | 110.22
110.21 |
| 787.89 | 110.23 | 814.09 | 110.36 | 850.12 | 111.07 | 882.88 | 110.41 | 902.54 | 109.75 |
| 928.75 | 109.94 | 935.3 | 110.18 | 968.07 | 110.21 | 977.9 | | 1017.21 | 110.39 |
| 1023.77 | 110.82 | 1033.59 | 106.43 | 1040.15 | 104.76 | 1053.15 | 102.52 | 1060.15 | 102.28 |
| 1079.15 | | 1090.15 | | 1092.15 | | 1101.15 | | 1126.15 | 77.92 |
| 1137.15 | | 1148.15 | | 1160.15 | | 1171.15 | | 1182.15 | 76.19 |
| 1203.15
1306.15 | | 1229.15
1317.15 | | 1251.15
1330.15 | | 1273.15
1351.15 | | 1290.15
1363.15 | 92.7
101.42 |
| 1376.15 | | 1391.15 | | 1407.15 | 102.45 | 1407.3 | | 1413.86 | 105.52 |
| 1417.14 | | 1430.26 | | 1459.79 | | 1486.04 | 107.64 | 1492.6 | 107.85 |
| 1499.16 | | 1505.72 | 104.98 | 1509 | | 1535.25 | | 1545.09 | 106.84 |
| 1568.06 | | 1574.62 | | 1584.46 | | 1591.02 | | 1613.98 | 104.73 |
| 1630.39
1735.37 | 105.41 | 1650.07
1764.9 | 105.18 | 1679.6
1778.02 | 105.31 | 1696
1791.14 | | 1715.69
1804.27 | 105.46
108.21 |
| 1817.39 | | 1827.23 | | 1853.48 | | 1873.16 | | 1899.41 | 107.62 |
| 1915.81 | 107.02 | 1951.9 | | 1981.43 | | 2007.67 | | 2033.92 | 107.41 |
| 2053.6 | | 2060.16 | 108.59 | 2070 | | 2099.51 | | 2109.35 | 108.64 |
| 2129.03 | 109.35 | 2165.1 | 109.56 | 2181.5 | | 2201.18 | | | 109.25 |
| 2260.21 | | 2279.89 | 108.07 | 2309.4 | | 2335.64 | | 2345.47 | 108.9 |
| 2355.31
2404.51 | 108.51 | 2361.87 2420.9 | | 2371.71
2427.46 | | 2378.27
2447.14 | | 2388.11 2470.09 | 107.73
107.35 |
| 2525.85 | | 2542.24 | | 2561.92 | | 2578.32 | | 2597.99 | 106.88 |
| 2650.47 | | 2663.58 | 107.54 | 2676.7 | | 2683.26 | | 2689.82 | 105.15 |
| 2706.22 | | 2735.73 | 106.85 | 2752.13 | | 2778.37 | | 2794.76 | 106.42 |
| 2840.68 | | 2857.07 | | 2870.19 | | 2912.82 | | 2922.66 | 106.29 |
| 2939.06 | | 2958.74 | | 2984.97 | | 2998.09 | | 3011.21 | 106.24 |
| 3037.45
3103.03 | 106.52 | 3060.4
3116.15 | | 3066.96
3122.71 | 107.16 | 3076.8
3152.23 | | 3086.64
3158.79 | 109.92
110.76 |
| 3171.9 | | 3207.98 | | 3237.49 | | 3270.29 | | 3273.57 | 110.76 |
| 3289.96 | 110.29 | 3299.8 | | 3312.92 | | 3319.48 | | 3326.04 | 110.52 |
| 3339.16 | 110.89 | 3352.27 | | 3362.11 | | 3398.19 | | 3404.75 | 110.78 |
| 3417.86 | | 3430.98 | | 3447.38 | | 3463.78 | | 3483.45 | 110.34 |
| 3493.29 | | 3503.13 | | 3516.25 | | 3532.65 | | 3539.21 | 110.28 |
| 3555.6
3624.47 | | 3565.44
3634.31 | 109.93 | 3572
3644.15 | 109.66 | 3591.68
3660.55 | 109.57 | 3604.79
3670.38 | 109.81
109.7 |
| 3683.5 | 109.48 | | | 3709.74 | | 3739.25 | | 3758.93 | 109.13 |
| 3765.49 | 109.37 | 3791.73 | 108.97 | 3811.4 | 109.05 | 3824.52 | 108.73 | 3857.31 | 108.67 |
| 3867.15 | | 3916.35 | | 3932.74 | 108.76 | 3939.3 | | 3952.42 | 108.88 |
| 3958.98 | | 3981.94 | | 3995.05 | | 4027.85 | | 4044.25 | 108.28 |
| 4073.76
4165.59 | | 4093.44
4185.26 | | 4132.79
4204.94 | | 4139.35
4221.34 | | 4149.19 | 108.19
107.74 |
| 4241.02 | | 4260.69 | | 4277.09 | | 4290.21 | | 4300.05 | 108.01 |
| 4313.17 | 108.16 | 4323 | 107.55 | 4339.4 | | 4368.92 | | 4382.03 | 108 |
| 4401.71 | | 4421.39 | | 4434.51 | 108.07 | 4441.07 | 107.84 | 4470.58 | 107.88 |
| 4486.98 | 107.44 | 4500.1 | | 4506.66 | 107.31 | 4536.17 | | 4546.01 | 107.58 |
| 4568.97
4657.51 | | 4585.36
4673.91 | 107.54 | 4595.2
4683.75 | 107.31 | 4624.72
4726.38 | 107.47 | 4650.95
4752.62 | 107.35
107.6 |
| 4772.3 | | 4808.37 | | 4818.21 | | 4828.05 | | | 108.59 |
| 4873.96 | | 4903.48 | | 4913.32 | | 4946.11 | | 4965.79 | 109.06 |
| 4995.3 | | 5005.14 | 108.51 | 5011.7 | | 5018.26 | | 5034.66 | 108.83 |
| 5060.89 | | 5093.69 | | 5106.81 | | 5119.92 | | | 108.55 |
| 5152.72 | | 5165.84 | | 5178.96 | | 5188.79 | | 5208.47 | 108.63 |
| 5215.03
5313.42 | | 5241.27
5326.53 | | 5264.22
5339.65 | | 5290.46
5352.77 | | 5293.74
5369.17 | 108.93
108.69 |
| 5379.01 | | 5401.96 | | 5418.36 | | 5424.92 | | 5447.88 | 108.98 |
| 5457.71 | | 5470.83 | | 5480.67 | | 5500.35 | | 5506.91 | 109.5 |
| 5520.02 | 109.87 | 5546.26 | 109.41 | 5556.1 | 108.18 | 5562.66 | 107.75 | 5572.5 | 109.28 |
| 5598.73 | | 5628.25 | | 5641.37 | | 5654.48 | | 5674.16 | 108.88 |
| 5687.28 | 108.36 | 5700.4 | 108.64 | 5716.8 | | 5729.91 | | 5743.03 | 108.54 |
| 5772.55
5838.14 | | 5779.11
5847.98 | | 5788.94
5854.53 | 108.59 | 5811.9
5864.37 | | 5825.02
5880.77 | 108.25
108.61 |
| 5890.61 | | 5897.17 | | 5907.01 | | 5916.85 | | 5926.68 | 110.08 |
| 5949.64 | | 5966.04 | | 5975.88 | | 5985.71 | | 5998.83 | 114.84 |
| | | | | | | | | | |

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6061.14
6136.57
                113.32 6070.98
                                          112.97 6080.82
                                                                   113.16 6090.66
112.61 6202.16
                                                                                             112.86 6123.45
                                                                                                                       114.15
  6234.96
                113.71 6251.35
                                          113.99 6261.19
                                                                   113.83 6277.59
                                                                                             114.46 6287.43
                114.74 6320.22
                                                                   114.13 6343.18
115.74 6412.05
  6313.67
                                          114.18 6333.34
                                                                                             114.47 6353.02
                                         115.45 6402.21
116.22 6451.4
115.27 6559.63
  6375.98
                115.63 6382.53
                                                                                             115.59 6421.89
                115.89 6441.57
114.97 6536.67
                                                                   115.54 6471.08
115.29 6576.03
                                                                                             114.97 6484.2
115.71 6585.86
  6431.73
  6526.83
                                         116.5 6684.25
119.02 6772.8
115.54 6861.34
115.93 6933.49
115.51 6972.85
  6612.1
6749.84
                115.79 6644.9
                                                                   116.66 6723.6
118.61 6805.59
                                                                                             117.25 6733.44
118.76 6835.11
               117.25 6851.5
115.58 6923.65
115.47 6966.29
115.24 7028.6
115.43 7090.91
                                                                   115.58 6871.18
116.84 6940.05
116.9 6982.69
  6841.67
                                                                                             116.71 6877.74
                                                                                             115.92 6953.17
117.19 7002.36
  6963.01
                                                                   115.32 7048.28
115.63 7113.87
                                          114.53 7038.44
115.01 7100.75
                                                                                             114.91 7064.67
116.08 7120.42
  7015.48
  7074.51
                                                                                                                       115.62
                                         114.87 7149.94
115.19 7218.81
116.92 7304.08
117.57 7376.23
119.85 7441.82
                                                                   115.03 7113.87
115.15 7163.06
115.64 7238.49
116.95 7317.19
118.58 7382.79
120.3 7451.65
                                                                                             114.93 7186.01
115.94 7251.6
117.36 7346.71
119.79 7389.34
121.43 7461.49
  7130.26
                115.54 7146.66
114.93 7212.25
                116.52 7284.4
117.92 7363.11
      7268
  7353.27
   7395.9
                119.55 7402.46
                                                                                                                       123.03
              123.07 7497.57
129.79 7645.15
 7481.17
7599.23
                                         124.51 7520.52
132.45 7664.82
                                                                   125.01 7533.64
133.75 7677.94
                                                                                            125.55 7563.16
134.1 7691.06
  7697.62 133.56 7710.74
                                         134.93 7733.69
                                                                   136.02 7743.53 136.02 7750.09 135.45
Manning's n Values num= 4
Sta n Val Sta n Val Sta
0 .066 1060.15 .025 1330.15
                                                                   n Val Sta
.085 5985.71
Bank Sta: Left Right
                                         Lengths: Left Channel
                                                                                 Right
                                                                                                Coeff Contr. Expan.
                                                                   1625 1934.01
1053.15 1407.15 859.81 1625 1934.01

Left Levee Station= 96.86 Elevation= 128.47

Right Levee Station= 7733.69 Elevation= 136.02
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                      128.36
                                                                                                      Left OB
                                                                                                                                         Right OB
                                                             Element
                                                                                                                       Channel
                                                            Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                       0.027
1625.00
                                                0.20
                                                                                                        0.066
                                                                                                       859.81
   Crit W.S. (ft)
E.G. Slope (ft/ft)
                                             114.61
                                                                                                   14743.62
                                                                                                                     13727.39
                                                                                                                                       109699.80
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                     19670.86
                                                                                                                       81141.32
                                         235000.00
                                                              Flow (cfs)
                                                                                                                                         134187.80
                                                            Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                                         354.00
                                               1.70
                                                                                                          1.33
                                                                                                                           5.91
                                                                                                                                             1.22
                                                            Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                               54 43
                                                                                                        15 50
                                                                                                                          38 78
                                                                                                                                              14052720.0
                                          24610200.0
                                                                                                        2060016.0
                                                                                                                           8497463.0
                                           1695.17
73.72
                                                                                                                        361.97
0.22
                                                                                                                                         6178 76
                                                                                                       953.63
                                                             Stream Power (lb/ft s)
Cum Volume (acre-ft)
   Alpha
Frctn Loss (ft)
                                                4.52
                                                                                                          0.12
                                                                                                                            1.28
                                                                                                                                              0.12
                                                                                                                       71873.50
                                                                                                                                         221156
                                                                                                    192296.90
                                                                                                                                      25934.95
                                                                                                                       2924.04
   C & E Loss (ft)
                                                0.11
                                                            Cum SA (acres)
                                                                                                    23298.96
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 170

115.44 6015.23

INPUT

Description: RGV-04. Station Elevation Data Sta Elev 0 123.08 17 17 120.39 Sta Elev Sta Elev Sta 6.74 59.71 123.51 121.75 127.47 13.48 62.86 121.88 28.28 120.65 70.76 125.78 34.58 78.57 120.38 94.34 127.85 170.77 120.58 96.46 109.2 123.49 115.57 122.18 126.18 122.42 179.26 308.76 185.63 319.38 208.98 359.71 120.62 276.92 113.99 115.3 113.87 114.4 370.33 389.43 467.98 112.36 113.75 395.8 474.35 408.54 499.83 112.57 113.04 112.88 436.14 113.23 113.51 114.02 444.63 527.42 584.75 535.92 597.48 544.41 620.84 705.75 111.93 110.83 557.15 637.82 111.63 112.08 565.64 654.81 111.72 111.94 113.33 110 62 110.3 669.66 767.32 837.38 966.88 680 28 110.41 110 88 758 82 110 25 110.44 775.81 109.88 809.78 907.43 108.94 108.46 824.64 937.15 108.77 890.45 108.8 979.61 108.65 988.1 1045.42 108.92 1002.97 109.95 1064.53 108.85 1019.95 109.44 1075.14 108.98 1028.44 109.73 1079.39 109.59 1032.69 110.22 1094.25 110.64 1126.1 110.72 1170.67 109.97 1136.71 110.56 1181.29 109.98 1145.2 110.81 1194.03 110.41 1153.69 110.65 1204.64 1106.98 110 14 1164.3 110.63 1240.73 110.47 1308.67 110.75 1389.33 110.52 1253.47 111.14 1319.28 111.03 1399.95 110.45 1234.36 1211 01 110.84 1272.57 110 63 110.82 1300.17 110.84 1346.88 1283.19 1357.49 111.05 1376.6 110.82 1408.44 111.16 110.68 1431.8 111.08 1482.74 111.1 1438.17 110.47 1516.71 110.76 1444.54 110.73 1525.2 111.01 1463.64 111.12 1548.55 1425.42 1470.01 110.61 1557.05 110.98 1569.79 110 1682.3 110.68 1588.89 110.06 1699.28 110.91 1616.49 109.65 1718.39 110.48 1637.72 109.98 1739.62 110.35 1754.48 109.08 1826.66 109.88 1773.59 110.18 1835.15 109.53 1790.57 109.62 1850.01 109.53 1796.94 109.88 1856.38 1748 11 109 17 109.87 1873.36 109.61 1890.34 1862.75 110.12 1896.72 110.53 1909.46 110.34 1924.31 1977.38 111 1949.79 110.3 2002.86 111.15 1968.9 110.73 2024.09 110.95 1934.93 110.63 1962.53 109.92 2011.35 109.87 1988 111.42 2041.07 109.66 2094.15 111.23 2049.57 111.38 2098.4 113.2 2142.2 2028.34 2087.78 110.14 2066.55 111.83 2109.01 109.5 2083.53 112.02 2119.62 105.72 21703 97.75 2235.62 2170103.3103 2125.99 113.48 2130.24 109.01 2154.17 2182.44102.0568 2186.17 101.84 2200.77 99.62 2218.16 2238.79 94.12 2253.08 91.41 2281.06 84.46 2295.65 80.35 2310.23 78.19 77.26 2371.32 81.19 94.1 2441.4397.01582 76.64 2332.15 86.03 2395.89 76.38 2346.75 90.26 2397.12 74.84 2359.03 92.11 2423.47 2383.61 2465.0799.22183 2490.07 2542.25 104.62 2554.99 101.32 2507.77 105.8 2555.11 102.52 2528.85 106.95 2563.41 103.44 2534.19 108.13 2574.47 108.95 2620.76 108.5 2678.07 108.41 2627.37 107.75 2682.48 107.01 2645.01 107.06 2697.9 107.01 2651.62 107.1 2708.93 2594.31 2697.9 107.19 2779.46 109.15 2858.81 107.49 2962.4 2722 15 107.28 2741.99 108.23 2825.75 107 33 2753 107.49 2799.29 108 04 108.75 2841.17 107.55 2944.77 108.31 2924.93 2889.66 107.66 2980.03 2993.25 108.92 3024.1 110.26 3132.06 108.94 3041.22109.4494 3068.17 110.21 3165.11 110.56 3189.35 109.91 3092.41 111.09 3206.97 3110.03 110.87 111.27 3217.99 110.61 3229.01 110.43 3257.65 110.53 3310.53

```
3411.88 110.45 3420.69
                                                                                109.75 3533.06
109.36 3627.8
111.2 3698.3
  3480.18
3577.12
                   109.63 3491.2
                                                 109.82 3522.05
                                                                                                              110.06 3541.87
                                                                                                                                             109.82
  3654.25
                   109.56 3674.07
                                                 109.81 3687.29
                                                                                                              111.54 3711.53
                                                                                                                                             111.38
  3731.36
                   111.43 3768.81
                                                  111.23 3788.64
                                                                                111.34 3843.72
                                                                                                               110.94 3856.95
  3865.75
                   110.99 3872.37
                                                 111.22 3909.82
                                                                                111.01 3929.65
                                                                                                              111.14 3953.89
                                                                                                                                             110.89
   3960.5
4026.6
                  110.5 3975.92
110.43 4035.41
                                                 110.98 3991.35
110.55 4061.85
                                                                                 110.8 4002.36
110.4 4073.71
                                                                                                              110.45 4008.97
110.54 4080.11
                                                110.35 4011.85
110.39 4174.22
110.49 4278.74
111.01 4368.44
111.68 4458.44
112.39 4517.93
  4105.92
                  110.74 4138.96
110.14 4260.14
                                                                                110.61 4201.85
112.32 4291.56
                                                                                                              110.16 4221.07
112.37 4297.95
                  111.94 4336.4
111.35 4438.61
112.43 4511.33
112.61 4584.03
113.24 4667.76
                                                                                                              111.1 4394.55
111.8 4487.09
112.56 4548.78
113.03 4628.1
113.86 4742.67
  4317.19
                                                                                110.58 4381.25
                                                                                                                                             110.95
                                                                               110.58 4381.25
111.61 4462.85
112.13 4528.95
112.75 4617.08
113.56 4720.64
   4495.9
                                                 112.4 4597.25
113.42 4700.8
  4557.59
  4661.15
                                                                                                                                             113.85
                                                113.42 4700.8
114.63 4806.57
115.26 4936.56
115.25 5013.67
115.47 5118.07
116.74 5227.4
117.69 5339.77
119.78 5403.66
                                                                               114.54 4819.79 113.80 4742.01
114.54 4819.79 113.80 4742.01
115 4949.78 115.15 4964.3
114.9 5053.33 114.93 5075.37
116.69 5130.89 117 5150.28
116.94 5242.82 116.48 5280.27
                  114.2 4784.9
115.03 4914.53
114.85 4980.63
114.66 5105.26
  4765.69
  4976.22
  5092.44
 5170.11
5295.7
                   116.96 5183.33
                                                                                                                                             117.33
                   116.58 5322.14
119.03 5394.85
                                                                                118.57 5350.78
119.81 5434.51
                                                                                                              118.21 5357.39
119.55 5502.81
  5380.78
  5518.23
5582.13
                   120.05 5535.86
120.86 5595.35
                                                 120.22 5546.87
122.22 5610.77
                                                                                121.61 5553.48
123.51 5621.79
                                                                                                              121.04 5564.5
123.67 5628.4
                                                                               123.51 5621.79
125.98 5659.25
126.21 5727.54
125.98 5791.44
127.61 5875.17
128.95 5941.27
                  125.86 5643.82 125.54 5652.63
125.64 5705.52 125.81 5713.94
125.86 5769.41 125.71 5780.43
127.83 5853.91127.6682 5859.74
128.76 5921.44 128.69 5928.05
                                                                                                              124.79 5668.06
126.48 5736.36
  5635.01
  5756.19
                                                                                                               126.65 5820.08
                                                                                                                                             126.91
                                                                                                              128.03 5881.78
128.66 5947.88
 5837.71
5897.2
                  128.76 5921.44
128.01 5995.85
128.7 6104.31
129.73 6185.83
128.56 6229.9
128.56 6276.17
 5969.91
6077.88
                                                 128.56 6020.59
                                                                                128.53 6031.61
                                                                                                              128.74 6055.84
                                                 128.64 6130.75
                                                                                128.88 6148.38
                                                                                                                 129.4 6157.19
                                                                                                              129.25 6216.68
128.3 6265.15
  6163.8
6223.29
                                                129.77 6205.67
129.13 6234.31
                                                                                129.18 6210.07
128.82 6254.14
                                                                                                               127.87 6298.21
  6271.76
                                                   128.1 6284.98
                                                                                128.63 6291.59
                                                                                                                                              128.6
                  128.56 62/6.17
128.84 6318.03
128.25 6377.52
128.36 6463.58
129.77 6560.4
131.7 6626.49
                                                 128.16 6335.66
128.11 6392.95
                                                                                127.61 6342.27
128.67 6414.98
                                                                                                              128.05 6348.88
128.08 6441.42
129.66 6520.74
131.03 6604.52
  6304.82
  6366.51
                                                 129.02 6485.48
129.91 6569.21
133.23 6639.72
                                                                                129.56 6507.52
130.42 6573.62
  6448.03
  6529.55
  6613.28
                                                                                133.42 6650.73
                                                                                                               134.47 6674.97
                     135.9 6719.03
                                                 137.19 6771.91
                                                                                139.22 6785.14
                                                                                                               138.99 6793.95
                  140.44 6844.14
138.99 6880.58
135.37 6940.21
                                                                                                              137.74 6867.33
135.8 6917.02
134.2 6979.97
                                                140.12 6850.77
137.1 6893.83
133.97 6955.12
                                                                                138.41 6859.04
136.13 6902.11
133.82 6963.4
  6809.37
                                                                                                                                             138.86
  6933.58
                                                                                                                                             134.44
 7041.25 135.39 7046.22 133.57 7049.54 133.01 7059.47 133.09 7071.07 7085.97 135.39 7104.2 135.22 7112.48 133.92 7115.79 134.38 7124.08
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .186 2125.99 .066 2182.44 .015 2534.19
                                                                                                              n Val Sta
.066 4438.61
Bank Sta: Left Right 2154.17 2542.25
                                                 Lengths: Left Channel
                                                                                                                 Coeff Contr. Expan.
2154.17 2542.25 859.81 1625 1934.01

Left Levee Station= 78.6 Elevation= 127.93

Right Levee Station= 6811.06 Elevation= 140.515
Right Levee States
Blocked Obstructions
Sta L Sta R Elev
                                              num=
 Sta L Sta R Elev
2574.87 5737.23 108.61
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                 RS: 170.5
Description: RGV-04, Bathymetric elevations translated from IBWC 2008
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| Cross-sections | | | | | | | | | |
|-----------------|-----------|-----------------|--------|---------|--------|--------------------|--------|--------------------|------------------|
| Station E | Elevation | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 124.1 | 6.56 | 124.45 | 13.12 | 121.03 | 16.4 | 120.32 | 45.91 | 120.28 |
| 59.03 | 123.19 | 68.87 | 126.49 | 75.43 | 127.61 | 81.98 | 127.66 | 91.82 | 127.24 |
| 95.1 | 126.53 | 104.94 | 122.53 | 114.78 | 118.94 | 124.62 | 116.51 | 141.01 | 117.3 |
| 157.41 | 116.8 | 170.53 | 116.82 | 180.36 | 116.5 | 209.88 | 116.49 | 216.44 | 117.13 |
| 223 | 117.18 | 232.83 | 116.01 | 255.79 | 115.76 | 268.91 | 115.88 | 285.3 | 115.44 |
| 304.98 | 115.34 | 318.1 | 114.48 | 327.94 | 114.34 | 373.85 | 112.06 | 380.41 | 112.04 |
| 403.36 | 111.12 | 416.48 | 110.96 | 423.04 | 110.57 | 439.44 | 110.61 | 482.07 | 112.1 |
| 501.74 | 112.51 | 518.14 | 112.09 | 534.54 | 109.09 | 541.1 | 108.53 | 547.65 | 108.77 |
| 557.49 | 110.22 | 560.77 | 109.9 | 577.17 | 109.92 | 596.85 | 110.67 | 619.8 | 111.06 |
| 632.92 | 110.71 | 642.76 | 111.25 | 652.59 | 111.17 | 668.99 | 111.76 | 678.83 | 111.27 |
| 688.67 | 111.44 | 701.79 | 112 | 708.34 | 111.81 | 718.18 | 112.28 | 734.58 | 111.33 |
| 744.42 | 111.16 | 760.81 | 110.34 | 773.93 | 111.02 | 787.05 | 108.24 | 793.61 | 107.88 |
| 806.73 | 107.69 | 819.84 | 107.89 | 826.4 | 107.23 | 849.36 | 105.73 | 869.03 | 105.1 |
| 885.43 | 105.75 | 895.27 | 105.7 | 905.11 | 106.2 | 924.78 | 107.91 | 931.34 | 108.71 |
| 944.46 | 108.8 | 957.58 | 108.45 | 967.41 | 107.07 | 980.53 | 106.03 | 996.93 | 105.42 |
| 1019.88 | | 1036.28 | | 1042.84 | | 1059.24 | | 1069.07 | 106.66 |
| 1075.63 | | 1105.15 | | 1118.26 | | 1131.38 | | 1134.66 | 106.46 |
| 1144.5 | | 1157.62 | | 1167.45 | | 1196.97 | | 1219.92 | 105.42 |
| 1239.6 | | 1249.44 | | 1265.83 | | 1275.67 | | 1321.58 | 106.69 |
| 1347.82 | | 1367.49 | | 1374.05 | | 1393.73 | | 1406.84 | 106.87 |
| 1429.8 | | 1439.64 | | 1459.31 | | 1472.43 | | 1495.39 | 107.44 |
| 1511.78 | | 1521.62 | | 1528.18 | | 1534.74 | 108.94 | 1541.3 | 108.63 |
| 1560.97 | | 1590.49 | | 1606.88 | | 1613.44 | | 1623.28 | 110.26 |
| 1636.4 | | 1642.96 | | 1649.51 | | 1656.07 | | 1672.47 | 110.51 |
| 1685.59 | | 1695.42 | | 1701.98 | 109.73 | 1715.1 | | 1728.22 | 110.04 |
| 1744.61 | | 1754.45 | | 1770.85 | | 1790.53 | | 1806.92 | 111.62 |
| 1816.76 | | 1852.83 | | 1862.67 | | 1882.35 | | 1902.02 | 111.45 |
| 1911.86 | | 1928.26 | | 1941.37 | | 1954.49 | | 1961.05 | 111.07 |
| 1967.61 | | 1974.17 | | 1984.01 | | 1993.84 | | 2006.96 | 111.03 |
| 2026.64 | | 2043.03 | | 2059.43 | | 2062.71 | | 2072.55 | 111.28 |
| 2092.22 | | 2108.62 | | 2115.18 | | 2121.74 | | 2138.13 | 111.64 |
| 2147.97
2207 | | 2157.81 2216.84 | 111.80 | 2167.65 | | 2177.49
2236.51 | | 2193.88
2243.07 | 111.15
111.17 |
| 2249.63 | | 2216.84 | | 2223.4 | | 2288.98 | 111.16 | 2302.1 | 111.17 |
| 2318.5 | | 2328.33 | | 2338.17 | | 2351.29 | | 2302.1 | 111.93 |
| 2400.48 | | 2423.43 | | 2443.11 | | 2459.51 | | 2469.34 | 110.43 |
| 2400.48 | 110.62 | 2423.43 | | 2443.11 | | 2511.98 | | 2544.77 | 100.43 |
| 2551.33 | 108.97 | 2492.3 | | 2577.56 | | 2511.98 | | 2600.52 | 109.58 |
| 2623.47 | | 2626.75 | | 2633.31 | | 2646.43 | | 2656.27 | 109.12 |
| 2672.66 | | 2685.78 | 109.47 | 2698.9 | | 2712.01 | | 2721.85 | 107.46 |
| 2734.97 | | 2744.81 | | 2757.92 | | 2767.76 | | 2774.32 | 107.40 |
| 2780.88 | | 2803.84 | | 2813.67 | | 2823.51 | | 2839.91 | 109.43 |
| 2,00.00 | 200.79 | 2000.04 | 200.07 | 2010.07 | TT0.74 | 2020.01 | 100.01 | 2000.01 | 200.13 |

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111.2 2895.66
111.07 2977.64
                    110.14 2866.14
  2935.01
                    111.83 2948.13
                                                    111.16 2957.96
109.55 3016.99
                                                                                                                     112.11 2987.48
                                                                                                                                                      111.79
                                                                                     110.39 3030.11
  3053.06
                    111.27 3059.62
                                                    111.65 3072.74
                                                                                       111.6
                                                                                                    3079.3
                                                                                                                      112.78 3089.14
                                                                                     110.15 3131.77
  3098.97
                    112.36 3105.53
                                                     111.52 3112.09
                                                                                                                      109.29 3138.33
  3148.16
                    108.84 3164.56
                                                    109.41 3171.12
                                                                                     109.05 3180.96
                                                                                                                      112.45 3187.52
                    113.68 3220.31
110.56 3259.66
                                                    114.76 3230.15
109.41 3269.5
                                                                                     116.26 3236.71
106.35 3276.06
                                                                                                                     115.58 3243.26
104.85 3279.34
                                                    109.41 3269.5
101.96 3313.34
89.36 3433.34
    3253.1
  3293.34
                    102.96 3303.34
                                                                                     101.36 3333.34
87.96 3443.34
                                                                                                                       97.96 3363.34
86.96 3453.34
                                                                                                                     79.36 3513.34
93.36 3573.34
107.47 3702.29
109.41 3820.28
108.9 3954.65
                                                    82.96 3493.34
79.46 3553.34
104.76 3685.9
                                                                                     80.96 3503.34
85.36 3563.34
104.87 3692.46
109.77 3787.5
  3463.34
                      83.36 3473.34
  3533.34
3574.34
                       75.96 3543.34
                                                    104.76 3685.9
109.59 3758.01
109.32 3882.55
                    103.91 3682.63
109.45 3751.45
  3718.68
                    109.53 3843.22
                                                                                     108.97 3928.43
  3836.67
                                                                                                                     113.34 4036.59
113.47 4164.41
113.67 4246.35
111.87 4393.85
112.67 4511.84
  3990.71
                    111.15 4003.82
113.49 4085.75
                                                    112.02 4013.65
113.63 4131.64
                                                                                     113.01 4020.2
113.25 4144.75
                                                                                                                                                      113.26
                                                    113.2 4210.3
112.46 4292.24
111.27 4485.62
                                                                                     113.64 4226.69
112.49 4364.35
111.65 4488.89
                    113.28 4197.19
  4170.97
                                                                                                                                                      112.68
                   113.28 4197.19
112.82 4275.85
111.34 4479.06
111.67 4538.06
112.3 4583.95
  4433.18
                                                                                                                                                      111.59
                                                    112.21 4551.17
113.17 4590.5
                                                                                    111.65 4561
115.98 4597.06
                                                                                                                     111.87 4574.11 111.69
116.17 4600.33 115.73
  4521.67
  4580.67
                   112.3 4583.95
115.37 4620
113.95 4669.16
117.36 4767.49
120.97 4849.43
121.61 4914.98
121.18 4993.64
125.19 5042.81
                                                                                    115.98 4597.06
112.87 4636.39
115.32 4705.22
119.2 4800.27
121.39 4875.65
121.22 4941.2
                                                    113.68 4629.83
115.08 4679
                                                                                                                     112.76 4642.94
116.51 4734.72
  4610.17
  4656.05
                                                    115.08 4679
118.39 4787.16
121.55 4855.98
121.74 4934.65
120.68 5006.75
125.11 5052.64
                                                                                                                     119.51 4813.38
121.79 4892.04
  4747.83
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                                                                                                                      120.83 4954.31
  4905.15
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                                                                                     120.69 5013.31
124.81 5062.47
  4964.14
5026.42
                                                                                                                     122.16 5019.86
124.96 5082.14
                    125.42 5108.36
129.05 5164.08
                                                    123.94 5121.47
131.07 5173.91
  5101 81
                                                                                     124.82 5134.58
                                                                                                                      128.06 5141.14
                                                                                                                      131.12 5213.24
  5154.25
                                                                                     130.39
                                                                                                      5190.3
                                                                                     133.62 5272.24
139.07 5334.51
                   132.11 5242.74
137.2 5311.57
                                                    133.65 5259.13
138.15 5324.68
                                                                                                                     135.61 5278.79
138.71 5354.18
  5229.63
                   139.71 5377.12
141.72 5442.67
141.78 5488.56
140.77 5586.89
140.79 5642.61
                                                                                     140.78 5403.34
  5367.29
                                                      139.9 5396.79
                                                                                                                      141.48 5423.01
                                                                                                                                                      142.02
                                                    140.97 5449.23
141.77 5511.5
                                                                                    141.1 5459.06
140.87 5534.45
                                                                                                                     142.11 5468.89
140.44 5554.11
  5432.84
  5475.45
                                                                                                                                                      140.86
                                                    141.61 5600
140.69 5665.55
                                                                                     141.1 5609.83
141.25 5681.94
  5567.22
                                                                                                                      140.29 5622.94
                                                                                                                                                      140 27
  5632.77
                                                                                                                      141.25 5698.32
                                                    142.59 5737.66
  5708.16
                    142.39 5724.54
                                                                                     142.16 5767.15
                                                                                                                      142.28 5780.26
                                                     143.59 5806.48
                                                                                      144.74 5845.82
                                                    145.01 5904.81
139.5 5973.64
141.61 6016.25
                                                                                     144.51 5944.15
139.53 5983.48
138.29 6042.47
                                                                                                                     144.28 5947.42
141.1 5990.03
136.38 6058.86
                    144.46 5888.43
140.87 5967.09
  5875.31
                                                                                                                                                        143.8
  5957.26
  6003.14
                    142.06 6006.42
                                                                                                                                                      135.73
                    136.02 6088.36
131.89 6163.74
                                                    135.93 6114.58
131.88 6180.13
                                                                                     135.33 6121.13
132.65 6212.91
                                                                                                                      134.94 6134.24
133.16 6222.74
  6068.69
  6150.63
                  132.48 6265.35
130.27 6314.51
    6242.4
                                                    132 54 6275 18
                                                                                     131.71 6288.29
                                                                                                                      131.54 6294.85
                                                                                                                                                      130.61
                                                    131.14 6321.07
                                                                                       131.1 6327.62
                                                                                                                     130.21 6334.18
131.57 6393.17
  6344.01 131.4 6350.57 130.43 6370.23 6406.28 133.64 6422.67 135.26 6435.78 6468.56 133.65 6475.11 132.37 6481.67
                                                                                     130.61 6380.06
135.17 6448.89
                                                                                                                                                      131.89
                                                                                       133.3 6494.78
                                                                                                                      132.96 6498.06
Manning's n Values num=
             . value
ca n Val
0 *
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                                                                           Sta
                                                                                      n Val
                                                       .066 3293.34
                       .186 3236.71
                                                                                      .015 3574.34
                                                                                                                         .066 4003.82
Bank Sta: Left Right 3276.06 3574.34
                                                    Lengths: Left Channel
                                                                                                                                                        Expan.
| Stall | Stal
                                                                                                                                        .1
     Sta L Sta R Elev
0 1744.61 111.21
CROSS SECTION OUTPUT Profile #Design Flow
                                                       127.55
                                                                                                                                 Left OB
                                                                                                                                                                            Right OB
                                                                             Element
                                                                                                                                                       Channel
                                                                            Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
    Vel Head (ft)
W.S. Elev (ft)
                                                                                                                                0.181
1270.17
                                                                                                                                                      0.015
1075.00
                                                                                                                                                                             1060.89
    Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                         118.83
                                                                                                                             40558.21
                                                                                                                                                    10126.92
                                                                                                                                                                           16039.57
                                            0.000295
                                                                                                                                                                           16039.57
                                                                                                                                                    10126.92
                                                                                                                                                    173602.90
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                                                31157.57
                                                    235000.00
                                                                              Flow (cfs)
                                                                                                                                                                              30239.56
                                                       4922.35
                                                                             Top Width (ft)
                                                                                                                                3175.16
                                                                                                                                                        298.28
                                                                                                                                                                            1448.92
                                                                            Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                     0.77
                                                            3.52
                                                                                                                                                          17.14
                                                                                                                                                                                   1.89
    Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                           48 21
                                                                                                                                    12 77
                                                                                                                                                           33 95
                                                                                                                                                                                11 07
                                                    13683450.0
                                                                                                                                  1814225.0
                                                                                                                                                          10108450.0
                                                                                                                                                                            1451 81
                                                      1100.88
                                                                                                                                3181 37
                                                                                                                                                       310.01
            Ch El (ft)
                                                                             Shear (lb/sq ft
                                                                                                                                                            0.60
                                                                                                                                                          10.31
                                                          17.55
                                                                             Stream Power (lb/ft s)
    Alpha
                                                                                                                                      0.18
                                                                                                                                                                                   0.38
   Frctn Loss (ft)
C & E Loss (ft)
                                                                             Cum Volume (acre-ft)
                                                                                                                             191133.20
                                                                                                                                                      70933.10
                                                                                                                                                                            216387.60
                                                                                                                                                                          25621.04
                                                                                                                              23217.66
                                                                             Cum SA (acres)
                                                                                                                                                      2897.40
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
                  sections.
                  Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                    RS: 170.38*
Description: RGV-04,
Station Elevation Data
                                                    num=
         Sta
                      Elev
                                         Sta
                                                       Elev
                                                                          Sta
                                    5.12
                   120.59
                                                    120.77
                                                                       10.23
                                                                                                                     118.73
                                                                                                      18.27
                                                                                                                                        22.83 119.18
      31.97
                    121.09
                                         35.8
                                                    121.52
                                                                         46.8124.4496
                                                                                                       53.71
                                                                                                                     126.29
                                                                                                                                        58.83
                                                                                                                                                        126.9
    63.94
105.99
                                    73.64
122.15
                                                    126.62
115.73
                                                                    77.23 125.9
133.75 115.17
                                                                                                    87.21
147.05
                                                                                                                      116.54
                                                                                                                                      176.97
                    116.23
    190.07
                    116.25
                                    203.01
                                                    116.59
115.96
                                                                     212.7
283.86
                                                                                           116
                                                                                                     223.51
296.65
                                                                                                                     116.11
112.16
                                                                                                                                      248.28
                                                                                     114.74
    264.45
                      115.9
                                                                                                                                        306.5
    313.28
                    110.52
                                    336.54
                                                    109.76
                                                                     351.77
                                                                                     109.61
                                                                                                     359.82
                                                                                                                      109.85
                                                                                                                                      366.47
                                    426.31
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494 07

616.97

691.35 746.33

798.65

110 32

109.65

110.38

108.7

107.8

510 25

642.84

702.24 752.11

808.62

108 79

109.02

110.08

109.96 107.91

106.95

516.72 571.7

659.03

712.21 758.75

815.27

108 47

109.88

109.82

106.97

523.18

718.86 768.73

825.24

669

108 59

110.22

109.28

108.83

107.64

532 88

681.65

733.39

831.9

109 29

110.14

108.8

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108.33
                                915.01
                  105.29 1005.06
                                               105.98 1011.53
                                                                             105.86
                                                                                          1037.4
                                                                                                          106.25 1054.64
106.28 1124.72
                                                                                                                                       105.72
                                                                             106.49 1102.08
                                                                                                          106.09 1205.57
105.87 1331.69
  1134.42
                  106.21 1163.53
                                               105.83 1177.65
                                                                             106.09 1197.59
                                                                                                                                       105.93
                                                                             106.18 1312.3
106.24 1387.09
                                                106.23 1290.68
  1343.87
                  106.32 1357.57
                                                 106.1 1377.11
                                                                                                          106.54 1402.85
  1422.25
                  106.45 1443.6
106.92 1496.64
                                               107.02 1450.26
107.49 1503.1
                                                                             106.73 1460.22
107.32 1513.42
                                                                                                          106.72 1473.99
107.66 1551.62
                  107.5 1574.25
108.57 1645.4
109.11 1719.54
                                               108.09 1583.95
108.06 1661.57
  1567.78
                                                                             108.08 1596.89
                                                                                                          107.66 1603.36
108.83 1687.44
                                                                             108.29 1674.51
                                               108.86 1726.18
109.53 1812.62
109.58 1885.75
                                                                                                          109.44 1765.06
109.39 1835.88
  1703.61
                                                                             109.19 1748.89
                                                                                                                                         109.9
                  109.55 1796
109.26 1869.13
                                                                             109.86 1825.91
110.04 1902.38
                                                                                                          108.84 1910.59
  1849.19
  1923.53
1997.91
                  109.09 1939.7
109.08 2014.08
                                               108.76 1949.4
108.63 2027.02
                                                                                                          108.64 1981.74
108.88 2062.59
                                                                             108.89 1962.34
                                                                             108.58 2046.42
  2075.53
                  109.03 2091.69
109 2141.74
                                               108.83 2101.4
108.29 2151.72
                                                                             108.54 2111.1
108.08 2159.61
                                                                                                          109.01 2120.81
108.19 2169.32
                  108.25 2188.72
108.46 2253.4
109.3 2321.32
                                               108.02 2195.19
109.09 2269.57
109.14 2337.88
                                                                            108.24 2201.65
108.89 2279.27
109.46 2350.42
                                                                                                          107.99 2221.53
109 2288.97
109.51 2377.78
  2178.31
                                                                                                                                       108.04
  2301.91
                  109.08 2411.03
108.98 2487.49
                                               109.33 2424.8
109.54 2500.78
                                                                             109.3 2440.97
109.37 2517.41
                                                                                                          108.92 2447.44
108.89 2525.06
  2392.46
  2464.22
  2541.23
2617.14
                  109.11 2547.7
108.81 2650.39
                                               109.34 2570.33
108.59 2657.65
                                                                             109.56 2592.98
108.77 2667.01
                                                                                                          109.63 2602.68
108.61 2683.63
                                                                                                                                         109.1
                  106.84 2712.63
108.81 2767.61
                                               107.94 2719.1
108.55 2783.78
  2702.93
                                                                             107.92 2725.57
                                                                                                          107.36 2748.21
                                                                             109.41 2877.57
108.17 2958.42
110.25 3035.72
                                                                                                          109.36 2900.2
  2819.36
                  109.11 2838.76
                                               108.76
                                                            2861.4
                                                                                                                                       108.57
                                               109.06 2942.25
109.51 3019.87
                                                                                                          108.66 2981.06
110.27 3052.21
  2906.3
2993.99
                  108.52 2929.32
109.1 3013.4
  3078.08
3142.76
                  107.93 3092.14
                                               107.99 3110.42
112.87 3168.64
                                                                                                          111.39 3126.59
113.39 3195.85
                                                                             109.39 3120.12
                    112.1 3158.93
                                                                             113.68
                                                                                           3175.1
                                              112.87 3168.64 113.68 3175.1 113.39 3195.85 104.79 3217.3 103.07 3227.83101.6244 3237.44 95.11 3271.99 93.3989 3287.78 91.49 3301.21 85.71 3370.95 82.21 3380 80.87 3389.04 78.48 3425.2 78.26 3443.28 76.71 3453.02 89.51 3482.25 94.58 3482.58 95.2469 3483.23 100.2 3510.04 103.45 3539.86 104.56 3549.94 108.07 3591.93 108.61 3598.32 109.99 3607.9 110.94 3647.67 111.27 3689.33 111.2 3701.22
                 105.28 3211.71
98.54 3259.81
  3208.05
                    87.96 3343.83
   3321.34
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  3407.12
3462.77
                    79.3 3416.16
84.06 3472.51
   3489.4797.93324 3499.77
   3566.74 108.06 3573.46
  3623.87
                  111.14 3635.77
                  110.09 3713.12
                                                 110.4 3722.05
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                                               110.43 3811.26
110.31 3873.57
112.5 3953.72
                                                                             110.2 3817.19
110.61 3903.26
113.25 3968.55
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110.8 3912.18111.0645
112.95 3980.42 113.46
                  110.4 3790.48
110.31 3861.71
    3763.7
                  111.24 3944.8
    3918.1
                                              112.5 3953.72
113.65 4036.81
113.48 4173.62
112.51 4272.01
111.62 4388.3
110.79 4459.86
110.41 4504.59
113.09 4546.33
                 111.24 3944.8
113.71 4021.97
113.95 4155.72
112.84 4245.17
111.49 4382.34
                                                                             114.29 4042.75
113.66 4194.48
                                                                                                          114.07 4075.4
113.35 4210.05
  3995.27
                                                                                                                        4075.4
                                                                                                          111.96 4352.52
111.29 4417.6
  4228.26
                                                                             112.27
                                                                                          4322.7
                                                                                                                                       111 56
                                                                             111.18 4394.26
                                                                            111.18 4394.26
110.03 4468.57
110.64 4513.53
112 4555.28
117.1 4608.95
117.14 4665.18
117.28 46737.16
120.47 4839.96
121.63 4941.91
 137.39 111.49 1362.34
4433.03 111.02 4441.97
4479.49 110.71 4492.66
4525.46 112.93 4537.38
4592.36 114.47 4597.02
4636.06 116.9 4643.34
4689.01117.0701 4701.38
                                                                                                          109.93 4475.85
110.54 4516.52
111.94 4581.44
                                                                                                                                       110.17
                                               114.93 4602.99
116.69 4650.62
                                                                                                          118.36 4614.22
116.91 4679.75
                                               116.99 4719.81
                                                                                                           117 3
                                                                                                                           4764
                 119.41 4784.87
121.61 4887.28
                                               119.86 4817.67
121.48 4916.06
                                                                                                          120.97 4869.09
  4880.01
                                                                                                          121.09 4966.75
                                                                                                                                       120.94
                  121.59 4984.65
127.09 5062.06
                                                                                                          123.85 5044.28
132.7 5080.06
                                                123.86 5011.48
                                                                             124.55 5035.34
                                               129.17 5069.34
                                                                             131.72
                                                                                          5074.1
                                                                                                                                       133.18
                                              129.17 5069.34
132.86 5106.9
134.22 5167.65
137.15 5229.55
139.16 5316.93
141.76 5393.39
143 5473.66
144.15 5546.32
  5089.01
5157.59
                  132.78 5094.97
133.97 5160.37
                                                                             133.51 5116.67
133.73 5182.21
                                                                                                          133.69 5138.52
134.6 5196.78
                  136.84 5218.63
139.06 5302.37
                                                                             138.16 5240.47
139.97 5335.14
                                                                                                          137.98 5261.95
139.99 5349.7
  5204 06
                                                                                                                                       138 67
                                                                                                          142.78 5422.97
  5356.98
                  140.99 5386.11
                                                                             142.26 5407.96
                  142.62 5455.29
144.34 5539.25
                                                                             143.21 5488.06
143.94 5557.14
                                                                                                          143.63 5503.47
144.44 5568.16
  5517.19
                 144.34 5539.25
143.68 5590.01
142.71 5699.24
142.47 5761.14
142.57 5852.16
142.7 5938.8
143.5 5986.51
144.73 6070.77
  5578.02
5677.39
                                               143.63 5607.83
143.09 5713.81
                                                                             143.17 5640.99
142.74 5724.73
                                                                                                          142.73 5662.83
142.29 5739.29
                                              142.34 5786.62
142.6 5866.73
143.79 5950.73
                                                                             142.34 5804.83
142.37 5899.49
                                                                                                          142.12 5823.03
142.21 5914.05
  5750 21
                                                                                                                                         142 2
  5926.88
                                                                             143.74
                                                                                           5956.7
                                                                                                          143.33 5962.66
144.27 6019.65
                                                                                                                                       141.98
                                               143.6 5995.46
144.05 6079.37
                                                                             144.06 6007.39
142.23 6085.82
                                                                                                          141.46 6090.12
  6034.22
                  142.68 6109.47
137.59 6172.13
                                              142.89 6118.07
137.47 6186.87
  6100.87
                                                                             140.41 6137.65
                                                                                                          137.27 6144.54
                                                                                                          135.58 6214.82
  6158.34
                                                                             136.56 6195.47
                                                                                                                                       136.82
                 139.15 6246139.0946 6253.53
138.71 6305.13 138.06 6313.73
137.99 6350.28 138.07 6356.73
                                                                            139.01 6281.48
138.49 6326.63
                                                                                                          139.13 6287.93
137.96 6333.08
138.7 6384.68
  6241.07
                                                                                                                                       138.52
  6337 38
                                                                             138 55 6365 33
                                                                                                                                       140 28
  6392.78 140.36 6408.33
                                                 141.3 6419.08
                                                                            140.46 6423.38
                                              n Val Sta
.066 3237.44
                                                                             n Val
        Sta n Val Sta
0 .186 3208.05
                                                                                                          n Val
                                                                                .015 3499.77
                                                                                                             .066 3944.8
                                                                                                                                           .076
            a: Left Right 3211.71 3539.86
                                                                                                             Coeff Contr.
Bank Sta: Left
                                               Lengths: Left Channel
                                                                                           Right
                                                                                                                                         Expan.
                            Right Lengths: Left Channel Right 5539.86 1270.17 1075 1060.89 Station= 63.935 Elevation= 126.975 Station= 6034.22 Elevation= 144.73 tions num= 1
Left Levee
                            Station=
Left Levee
Right Levee Station=
Blocked Obstructions
Chart Sta R Elev
     Sta L Sta R Elev
0 1885.75 109.01
CROSS SECTION
RTVER: Rio Grande
                                               RS: 170.26
REACH: Lower Reach
Description: RGV-04, Bathymetric elevations translated from IBWC 2008
                              Sta num=
Sta Elev
13.11 117.14
55.73
98.3"
                       Cross-sections
Station Elevation Data
        Sta Elev
0 117.08
5.89 126.29
                                                                   Sta
                                             Elev Sta Elev
117.14 16.39 118.06
126 59 125.41
114.85 108.17 113.46
116.35 157.34 116.03
                                                                                            22.95 121.89
68.84 121.18
                                                                                                                          36.06
78.67
      45.89
                                98.34
144.23
                                                                                          114.73
196.68
       88.5
                  115.71
                                                                                                          113.39
                                                                                                                        118.01
                                                                            116.55
107.21
107.49
                                                                                                          109.84
107.73
107.99
    216 35
                 116.41
107.04
                                 239 29
                                               116.3
106.7
                                                              255 68
                                                                                           275.35
337.63
                                                                                                                        285 18
                                                                                                                                         107 7
                                314.68
367.13
                  107.62
                                                                                            390.08
    354.02
                                               107.38
                                                              376.96
                                                                                                                         403.19
    409.74
                  108.06
                                416.3
494.97
                                               107.82
108.36
                                                              429.41
504.8
                                                                            107.78
                                                                                           449.08
514.64
                                                                                                         108.3
      475.3
                  108.66
                                                                                                                        524.47
                  108.38
                                 553.97
                                                              567.09
622.81
                                               108.36
                                                                             108.13
                                                                                           573.64
                                                                                                          107.81
                                                                                                                         586.75
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658.87
                                                                                                                      685.09
    701.48
                       107.38
110.02
                                         724.43
763.76
                                                             106.04
                                                                                730.98
770.32
                                                                                                   106.93
                                                                                                                      737.54
780.15
                                                                                                                                        109.28
107.37
                                                                                                                                                           740.82
786.71
                                                                                                                                                                              109.82
                                                                                                  109.86 819.49
105.58 898.16
    796.54
848.99
                                                                                                                                        109.77 835.88
104.97 917.83
                          109.7
                                            803.1
                                                               110.2
                                                                                809.66
                                                                                                                                                                               108.29
                                                                               885.05
957.16
                       109.69
                                            862.1
                                                             109.68
       937.5
                          104.7
                                         950.61
                                                             104.89
                                                                                                     105.2
                                                                                                                      986.67
                                                                                                                                        105.73
                                                                                                                                                              996.5
  1003.06
1101.39
                        105.94 1022.72
105.86 1121.06
                                                             105.24 1039.11
106.37 1130.89
                                                                                                   105.36 1062.06
106.38 1144.01
                                                                                                                                        106.03 1075.17
106.81 1153.84
  1163.67
                       107.03 1176.79
105.92 1245.62
                                                             106.81 1189.9
105.7 1255.46
                                                                                                   107.23 1203.01
105.75 1265.29
                                                                                                                                         106.69 1216.12
                       106.92 1245.62
106.12 1330.85
105.87 1406.24
106.01 1475.08
105.74 1537.36
106.77 1635.69
                                                             105.49 1340.68
106.53 1412.8
106.12 1481.63
                                                                                                 105.6 1350.52
105.98 1422.63
105.56 1491.47
105.5 1576.69
106.92 1668.47
107.6 1727.48
107.63 1793.03
108.7 1858.59
106.23 1920.87
105.87 2019.21
106.1 2094.6
105.56 2156.89
106.28 2206.05
    1307.9
                                                                                                    105.6 1350.52
                                                                                                                                         106.18 1370.18
                                                                                                                                        105.93 1432.46
105.45 1507.86
  1465.24
                                                                                                                                        106.08 1602.92
107.15 1678.31
  1530.8
1616.03
                                                             106.04 1543.91
107.1 1658.64
                       107.03 1691.42
108.52 1770.09
107.58 1825.81
106.25 1888.09
106.37 1963.49
                                                             106.93 1704.53
108.56 1783.2
108.07 1842.2
  1684.86
                                                                                                                                        108.32 1753.7
107.67 1806.15
                                                                                                                                        106.83 1871.7
106.26 1940.54
106.03 2061.82
  1819.26
                                                             105.85 1901.21
105.97 1983.15
  1950.37
  2071.66
2117.55
                       106.56 2078.21
105.35 2127.38
                                                             106.59 2088.05
106.32 2130.66
                                                                                                                                        105.27 2104.44
105.16 2163.44
                                                                                                  105.56 2156.89
106.28 2206.05
107.33 2288
107.79 2360.12
109.52 2442.07
109.43 2484.68
109.69 2563.35
108.59 2632.19
                       105.15 2189.67
106.7 2245.39
                                                             105.75 2196.22
106.95 2278.17
                                                                                                                                        106.25 2212.61
107.59 2294.56
  2173.28
   2238.83
                                                                                                                                        107.59 2294.56
108.02 2379.79
109.31 2448.62
109.42 2507.63
108.96 2583.02
107.94 2645.3
107.59 2740.36
106.94 2819.01
                                                             106.95 2278.17
107.54 2353.56
108.49 2435.51
109.13 2471.57
109.52 2543.68
109.74 2628.91
                       107.64 2327.34
108.41 2412.57
109.25 2465.01
  2320.78
  2455.18
                       110.11 2533.85
109.11 2612.52
105.91 2701.03
107.1 2773.14
  2520.74
2596.13
                                                             106.62 2710.86
106.94 2789.53
  2671 53
                                                                                                   107.11 2733.81
                                                                                                   106.59 2805.92
   2753.47
                                                            106.94 2789.53
105.65 2858.27
107.05 2959.71
107.1 3031.7
110.54 3090.6
105.04 3146.22
91.77 3203.22
82.8 3269.22
77.47 3366.22
                       106.56 2848.46
106.87 2946.62
106.9 3021.88
                                                                                                  105.56 2877.91
107.7 2976.07
                                                                                                                                        106.73 2897.54
108.21 2982.62
  2835.37
                                                                                                   106.98 3041.51
                                                                                                                                         108.18 3048.06
   3005.52
                                                                                                                                                                                109.6
                       110.31 3084.05
107.58 3142.95
                                                                                                 110.9 3113.5
104.76 3151.22
89.29 3214.22
81.45 3281.22
                                                                                                                                        111.19 3126.59
101.9 3162.22
    3136.4
                          97.5 3189.22
84.07 3258.22
77.67 3353.22
                                                                                                                                         87.83 3226.22
79.67 3300.22
87.97 3398.22
  3169.22
   3244.22
   3317.22
                                                                                                     80.92 3389.22
                                                                                                  102.77 3447.26
111.98 3479.98
112.83 3542.15
112.72 3601.05
                                                                                                                                     104.76 3450.53
111.5 3493.07
112.38 3555.24
112.86 3614.13
                          96.35 3415.22
                                                             100.57 3418.22
                                                             111.54 3476.71
112.56 3529.06
113.04 3581.41
                       107.5 3473.43
112.56 3522.51
112.8 3568.32
   3457.07
  3506.15
3561.78
                                                            111.44 3637.04
111.43 3741.68
111.61 3803.69
112.23 3882.03
                       110.79 3627.22
111.76 3735.15
111.79 3790.64
  3620.68
3712.3
                                                                                                   111.24 3650.13
111.69 3761.26
                                                                                                                                        111.73 3682.85
111.38 3771.05
                                                                                                  111.99 3/61.26 111.38 37/1.05
111.97 3836.34 111.38 3852.66
112.61 3891.83 113.4 3908.15
113.91 3947.32 113.94 3966.9
114.6 4025.66 114.48 4038.71
114.03 4114 113.76 4133.68
   3784 11
                          112.3 3872.24
                                                           112.23 3882.03

113.58 3937.53

114.99 3989.75

114.01 4107.44

113.32 4173.03

112.14 4297.65

111.17 4363.24

110.72 4428.82

108.7 4491.13

113.91 4523.92

112.83 4579.67

121.17 4628.87

118.23 4727.25

121.52 4842.02
                                                                                                                                       113.4 3908.15
113.94 3966.9
114.48 4038.71
113.76 4133.68
112.84 4212.38
111.61 4320.6
110.7 4376.35
108.78 4458.34
109.67 4507.53
                      112.3 3872.24
112.8 3921.2
113.89 3983.22
114.38 4094.33
113.33 4156.63
112.5 4241.9
111.28 4353.4
110.59 4418.99
108.85 4484.57
   3914.68
                                                                                                                                                                                 113.7
  3973.43
4071.37
                                                                                                                                                                              113.67
                                                                                                  114.03 4114
112.93 4202.55
111.91 4307.49
111.52 4369.79
110.27 4448.5
108.97 4497.69
     4146.8
     4225.5
  4330.44
4412.43
                                                                                                                                                                               110 98
  4478.01
                                                                                                                                                                               109.42
                                                                                                                                        109.67 4507.53
114.1 4543.6
112.99 4599.35
120.68 4678.06
117.69 4783
121.87 4881.38
120.68 4989.6
                        110.15 4520.65
112.09 4566.56
                                                                                                   114.24 4533.76
112.75 4596.07
  4553.44
                                                                                                  112.75 4596.07
121.49 4648.54
118.19 4753.48
121.59 4855.14
121.44 4966.64
126.75 5028.95
127.39 5081.42
139.53 5124.05
                       112.09 4566.56

118.43 4612.47

118.66 4714.13

120.91 4805.95

121.72 4933.85

120.48 5012.55
  4605.91
4701.01
                                                            118.23 4727.25
121.52 4842.02
121.35 4950.24
121.91 5025.67
127.55 5071.58
132.92 5120.77
  4799.39
                                                                                                                                         126.42 5045.35
  5005.99
                       127.98 5061.74
128.58 5101.1
                                                                                                                                        126.95 5084.7
140.43 5130.61
  5091.26
                       140.42 5147.01
142.59 5222.43
144.27 5288.02
146.12 5356.89
                                                            140.62 5160.12
143.5 5228.99
145.43 5297.86
146.24 5360.17
  5140.45
5215.87
                                                                                                   142.2 5183.08
143.54 5235.55
                                                                                                                                        142.65 5206.04
144.16 5245.39
                                                                                                  143.54 5235.55
145.17 5304.42
146.14 5409.36
146.52 5507.74
146.4 5596.28
146.78 5655.31
                                                                                                                                        144.16 5245.39
145.55 5314.25
146.37 5422.48
146.32 5533.97
146.99 5612.68
146.78 5661.87
  5255 23
   5330.65
                                                             146.24 5360.17
146.3 5494.62
146.23 5576.61
147.32 5642.19
145.45 5711.06
144.33 5871.75
                       146.36 5465.11
146.28 5563.49
146.89 5635.63
  5442.15
   5543.81
  5629.08
                       145.58 5697.94
144.64 5832.4
142.75 5989.81
143.3 6081.63
                                                                                                   145.19 5720.9
144.13 5888.15
                                                                                                                                        145.27 5786.49
143.85 5937.34
  5806.16
  5963.57
6075.07
                                                             142.52 5993.09
142.79 6088.19
                                                                                                   142.61 6052.12
142.77 6094.75
                                                                                                                                        141.89 6061.95
141.98 6098.03
  6101 31
                          139.3 6111.14
                                                             142 37 6120 98
                                                                                                   142.35 6127.54
                                                                                                                                         142 64 6137 38
                                                                                                                                                                               143 85
                       144.22 6163.61
143.74 6219.36
                                                             144.04 6180.01
142.78 6229.2
                                                                                                  144.45 6186.57
138.31 6232.48
  6216.08
                                                                                                                                        137.92 6239.04
                                                                                                                                                                                 139.2
                                                             138.12 6255.44
145.88 6317.74
  6245.6
6278.39
                       139.25 6252.16
145.29 6304.63
                                                                                                   138.56
145.81
                                                                                                                   6262
6324.3
                                                                                                                                        140.87 6268.55
145.55 6337.42
  6343.98 145.12 6350.54 145.54 6357.1
                                                                                                  147.51 6363.66
                                                                                                                                        148.65 6370.21
Manning's n Values
                                                             num=
                                                                                       6
  Sta n Val Sta
0 .085 45.89
6180.01 .085
                                                Sta n Val
                                                                                       Sta
                                                                                                   n Val
                                                                                                                                         n Val Sta
.12 4605.91
                                                                .12 3203.22
                                                                                                       .025 3398.22
Bank Sta: Left Right 3113.5 3529.06
                                                             Lengths: Left Channel Right 1559.58 2150 1999.52
                                                                                                                                             Coeff Contr.
3113.5 3529.06 1559.58 2150 1999.52
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 3113.5 111.19 T
3529.06 6370.21 112.83 T
Left Levee Station= 45.89 Elevation= 126.29
Right Levee Station= 6180.01 Elevation= 144.45
Blocked Obstructions num= 1
Sta L Sta R Elev
    Sta L Sta R Elev
0 1144.01 106.81
CROSS SECTION OUTPUT Profile #Design Flow
    E.G. Elev (ft)
Vel Head (ft)
                                                                                         Element
Wt. n-Val.
                                                                                                                                                                                                        Right OB
                                                                                        Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                                                                                  0.083
    W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                                                              2150.00
                                                                                                                                                                                                        1999.52
                                                                                                                                                    1559.58
    E.G. Slope (ft/ft) 0.001370
Q Total (cfs) 235000.00
Top Width (ft) 4963 40
                                                                                                                                                  53544 89
                                                                                                                                                                          13086.14
                                                                                                                                                                                                      16262 23
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                                                                    112520.70
                                                                                                                                                                                 84723.97
                                                                                                                                                     3054.75
                                                                                                                                                                                 415.56
                                                                                                                                                                                                         1493.10
                                                              3.32
47.98
                                                                                                                                                        2.65
13.91
                                                                                                                                                                                   6.47
                                                      6347933.0
    Conv. Total (cfs)
Length Wtd. (ft)
                                                                                        Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                    3039464.0
                                                                                                                                                                              2288605.0
                                                                                                                                                                                                             1019865.0
```

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Min Ch El (ft)
                                            Shear (lb/sq ft)
                                                                                        17.03
70370.01
Alpha
Frctn Loss (ft)
                                            Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                              3.14
                                                                                                          2.16
                                                                          188426.40
                                                                                                      215623.20
                                                                                                    25549.20
C & E Loss (ft.)
                                            Cum SA (acres)
                                                                          23035.55
                                                                                        2880.49
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Manning's n values were composited to a single value in the main channel. Note:

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 170.02 REACH: Lower Reach

TNPUT

Description: RGV-04, Bathymetric elevations translated from IBWC 2008 Cross-sections

num= Station Elevation Data ion Elev Sta Elev 0 117.82 52.46 117.05 38.53 126.34 120.16 Sta 16.39 Elev Sta 19.67 119.31 117.91 125.83 118.15 118.94 26.23 6.56 117.17 19.67 68.86 111.48 157.39 196.73 255.75 52 46 59.02 98.37 117.3 126.34 62.3 121.62 125.17 85.25 121.32 88.53 127.88 177.06 120.16 140.99 112.51 183.62 116.07 147.55 115.21 115 18 170.5 190.18 110.76 109.55 216.41 108.88 107.92 107.89 107.86 236.08 281.98 229.52 108.87 249.2 108.9 109.16 265.59 357.4 501.67 577.08 107.65 106.25 105.25 341 354.12 105.47 445.93 105.25 452.49 105.42 488.55 570.53 105.4 508.23 596.76 468.88 105.88 105.61 105.5 105.66 105.92 606.59 554.13 105.75 107.23 632.82 695.12 105.53 107.05 649.22 704.96 105.51 107.45 659 06 626.27 106.11 675 45 106 5 724.63 763.98 108.18 773.82 108.47 786.93 107.82 803.33 107.34 823 839.39 107.29 904.97 107.2 957.43 106.55 1023.01 107.15 914.81 107.53 963.99 106.81 1039.41 107.32 107.95 108.27 924.64 107.74 108.02 891.86 931.2 941.04 1006.62 970.55 1055.8 990.22 108.1 1068.91 1075.47 1157.44 108.46 1091.87 108.8 1170.56 1101.7 1180.4 108.29 1114.82 109.39 1190.23 108.35 1147.61 110.07 1203.35 109 109.62 1213.18 112.04 1219.74 111.86 1232.86 112.02 1239.42 112.51 1252.53 111.86 1232.86 112.64 1282.04 111.44 1337.78 104.79 1374 104.79 2046.01 104.76 2999.81 106.8 3045.42 1272.2 1255.81 112.19 112.41 1295.16 112.72 1308.27 111.92 1318.11 105.16 1373.85 103.64 2039.45 1311.55 110.63 1344.34 110.85 1347.62 110.31 1367.29 103.64 1379 104.97 2065.69 1709 2078.8 106.64 106.94 104.96 2101.75 107.01 3035.64 107.17 3077.99 112.08 3123.59 112.17 3195.25 2098.47 104.76 3003.07 107.06 3058.44 104.94 3019.36 107.79 3064.96 3029.13 107.26 3084.5 112.26 3143.13 3074 73 108.49 3094.27 111.17 3097.53 111.78 112.12 3152.9 110.76 3214.87 111.55 3227.99 3188.73 111.38 3205.04 110.09 111.57 3260.78 111.57 3323.07 110.35 3237.83 111.71 3247.66 111.78 3280.45 3231.27 109.77 3303.4 108.83 3349.3 3293.56 111.23 3313.24 111.28 3332.91 110.51 3346.02 3401.76 108.62 3372.25 104.35 3424.72 109.31 3388.65 106.1 3434.55 106.84 3395.21 107.47 3447.67 104.54 3414.88 108.36 3467.34 104.39 3509.96 105.76 3477.18 104.79 3536.19 105.04 3480.45 105.22 3552.59 3454 22 104.57 3487.01 105.81 3562.42 105.72 3582.1 104.74 3598.49 104.63 3611.6 105.09 3618.16 105.13 3628 106.43 3644.39 109.2 3709.97 106.9 3647.67 108.64 3716.52 106.83 3667.34 108.65 3723.08 108.35 3683.74 108.14 3729.64 3700.13 108.09 105.25 3746.03 107.48 3805.05 112.47 3864.07 112.88 3972.27 3739.48 3795.21 105.14 3755.87 107.21 3808.33 104.92 3765.71 107.5 3818.17 104.4 3788.66 109.63 3834.56 112.5 3906.69 113.16 3985.38 113.15 3926.37 112.84 4008.33 113.01 3949.32 113.15 4018.17 3841.12 113 18 110.4 4060.79 108.47 4119.81 109.31 4165.71 110.96 4047.68 4028.01 110.89 4034.56 110.39 4044.4 110.06 110.12 4087.02 107.29 4142.76 109.64 4096.86 109.32 4149.32 108.68 4106.7 109.53 4155.88 4073.91 4123.09 107.29 4142.76 109.44 4191.94 108.79 4241.12 107.82 4277.19 109.55 4326.37 108.02 4375.54 109.31 4165.71 109.41 4228.01 109.78 4264.07 108.93 4303.42 109.19 4349.32 109.06 4201.78 109.8 4247.68 109.41 4221.45 110.28 4257.52 4178.83 4234.57 107.91 4287.02 108.85 4332.92 108.25 4293.58 109.14 4342.76 4267.35 4316.53 108 41 4401 77 109.3 4365 71 108 25 4385 38 108 09 4395 22 108.02 4375.54 108.2 4421.44 107.57 4464.06 109.07 4493.57 108.16 4552.58 108.09 4395.22 108.19 4437.84 107.9 4480.46 108.56 4509.96 108.06 4578.81 108.38 4431.28 108.03 4470.62 107.67 4450.95 108.06 4483.74 4457.51 4490.29 4539.47 109.13 4503.41 107.7 4568.98 107.94 4523.08 107.35 4601.76 107.38 107.88 4696.84 108.72 4768.97 108.12 4867.32 108.79 4932.89 107.69 4641.1 108.22 4723.07 107.64 4657.5 108.58 4746.02 108.12 4677.17 108.45 4759.13 4624.71 4706.68 108.22 4723.07 108.21 4791.92 108.18 4893.55 107.49 4982.07 107.63 5044.36 107.31 5132.88 108.64 4818.15 108.27 4903.39 108.24 4995.19 108.08 4854.21 4778 8 108 37 108.61 4916.5 108.79 5005.02 4968.96 108 5021.41 5027.97 5116.49 107.22 5073.87 107.18 5146 107.46 5083.71 107.45 5172.23 107.74 5100.1 107.69 5178.78 5205.01 5286.97 108.31 5224.68 109.77 5293.53 108.93 5244.35 108.75 5296.81 109.21 5250.91 109.27 5303.37 109.07 5273.86 114.5 5306.65 115.39 5329.6 111.94 5362.38 113.24 5408.28 116.4 5316.48 112.44 5345.99 115.37 5326.32 111.87 5355.82 114.81 5332.87 112.83 5375.49 5309 92 113 22 113.26 5395.17 112.83 5398.44 5385.33 118.04 5418.12 124.77 5421.39 125.71 5427.95 122.78 5470.57 125.58 5434.51 122.49 5477.13 122.77 5454.18 125.15 5486.96 123.07 5441.06 122.8 5483.69 5467.29 5493.52 5552.53 125.9 5500.08 125.91 5559.09 125.46 5509.91 125.87 5562.37 125.33 5536.14 124.92 5568.93 125.27 5542.7 121.87 5572.21 121.6 5601.71 124.17 5696.79 121.31 5588.6 123.69 5690.23 122.29 5660.73 124.31 5729.58 5578.76 121.57 5647.61 122.96 123.92 5709.9 5683.68 124.12 5752.52 127.01 5798.42 129.64 5863.99 5739.41 126.07 5745.97 125.37 5749.25 124.31 5755.8 127.57 5811.54 130.7 5877.11 125.51 125.37 5749.25 126.78 5785.31 128.23 5857.44 131.6 5906.62 131.95 5972.19 126.97 5775.47 127.77 5844.32 5834.49 5886.94 5942.68 132.03 5896.78 131.85 5959.07 131.77 5926.29 132.22 6011.53 131.68 5936.12 132.76 6014.81 6024.64 132.97 6031.2 132.66 6054.15 132.73 6070.54 132.92 6083.66 133.45 134.8 6113.16 6142 67 133.51 6149.23 137.1 6155.78 137 92 6165 62 137.95 6185.29 138 46 138.94 6280.37 138.81 6290.2 138.38 6395.12 138.97 6372.17 6322.99 138.75 6355.77 138.52 6385.28 6401.67 137.57 6414.79 137.83 6513.14 138.85 6431.18 139.02 6447.57 138.24 6532.81 138.66 6463.96 137.71 6555.76 6503.31 137.88 6519.7 136.93 6595.11 135.95 6739.36 136.33 6663.95 136.57 6785.26 136.92 6588.55 136.75 6624.61

```
Printed at 13:42 on 03 Oct 2017
                                   138.02 6821.32
                                                         138.22 6831.16
                                                                               138.19 6837.72
                                                          138.09 6896.73
139.03 7001.64
136.48 7040.98
 6850.83
             137.96 6860.67
139.13 6968.86
                                    138.47 6873.78
                                                                               138.1 6919.68
138.25 7014.76
                                                                                                       138.26
              138.24 7031.15
                                    136.59 7034.43
                                                                                 137.23 7057.38
                                    141.58 7070.49
                                                          142.39 7080.33
Manning's n Values
                                    n Val
                                                   Sta n Val
                                                                                                      n Val
      Sta n Val Sta
0 .177 1373.85
                                                                                  n Val
                                                            .015
                                                                                   .066 2039.45
                                                                                                          .131
                                      .066
                                              1374
                                                                     1714

        Bank Sta: Left
        Right
        Lengths: Left Channel
        Right

        1373.85
        1714
        2106.1
        389.75
        107.13

        Left Levee
        Station=
        98.37
        Elevation=
        126.34

        Right Levee
        Station=
        7080.33
        Elevation=
        142.71

                                                                                    Coeff Contr.
                                                                                                         Expan.
Blocked Obstructions
                                  num=
 Sta L Sta R Elev
3162.36 5718.88 112.11
                           Elev
CROSS SECTION OUTPUT Profile #Design Flow
  F.G. Elev (ft)
                                     124.50
                                                                                        Left OB 0.177
                                                                                                       Channel 0.015
                                                                                                                       Right OB
   Vel Head (ft)
                                                     Wt. n-Val.
                                                                                                                          0.113
                                                     Reach Len. (ft)
Flow Area (sq ft)
                                       121.80
112.24
                                                                                                     389.75
10867.48
10867.48
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                        107.13
                                                                                        2106.10
                                                                                       17060.83
                                                                                                                      45513.29
                             0.00
235000.00
5338.71
3.20
32.16
                                                    Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                                                      17060.83
                                                                                                                     45513.29
                                                                                                       168731.70
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                       1251.76
0.79
                                                                                                                      3746.80
                                                                                                        340.15
                                                                                                          15.53
                                                                                          13.63
                                                                                                           31.95
                                                                                                                          12.15
  Conv. Total (cfs)
Length Wtd. (ft)
                                                     Conv. (cfs)
Wetted Per. (ft)
                                    14262020.0
                                                                                         815656.9
                                                                                                       10240240 0
                                                                                                                           3206129 0
                                    429.31
                                                                                        1255.37
                                                                                                         360.89
                                                                                                                       3752.14
                                                     Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                        0.51
7.92
  Min Ch El (ft)
                                        89.64
                                                                                           0.23
                                                                                                                           0.21
  Alpha
Frctn Loss (ft)
                                                                                                       69778.87
                                                                                      187162.40
                                                                                                                       214205.40
                                         0.10
                                                     Cum Volume (acre-ft)
                                          0.23
                                                     Cum SA (acres)
                                                                                                       2861.84
                                                                                                                    25428.93
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 \text{ m}). This may indicate the need for additional cross
             sections.
            Muning's n values were composited to a single value in the main channel.
Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                    RS: 169.9
INPUT
Description: RGV-04, New Cross-section, End wall, Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data
                                   num=
                                                460
      Sta Elev
0 122.85
                         Sta
9.71
                                       Elev
                                                Sta Elev
29.12 123.26
                                   122.92
                                                                       38.83 123.31
                                                                                             48.54
                                                                                                            123
                       77.88
117.25
173.02
268.16
             121.51
                                    116.92
                                                 84.44
                                                          114.53
                                                                       94.29
  104.13
              106.49
                                    106.73
                                               130.37
                                                          106.45 140.22
                                                                                 105.04
                                                                                            150.06
                                                                                                       104.46
    159.9
              104.49
                                    104.04
104.03
                                               189.43
323.93
                                                          104.06
                                                                      199.27
350.18
                                                                                 104.19
                                                                                            209.11
   248.48
                                                                                 103.95
                                                                                            366.58
              104.14
                                                          104.14
                        382.99
504.37
                                    104.11
103.87
                                               405.95
520.78
                                                                      425.64
537.18
625.76
   376 43
                  104
                                                          104 13
                                                                                 104 01
                                                                                            455 16
              104.06
                                                            103.8
                                                                                 104.03
   484.69
  573.27
              104.09
                         583.11
                                    104.32
                                               596.23
                                                          104.27
                                                                                 104.73
                                                                                            642.16 104.54
                         694.65
776.67
   665.13
                                                711.06
                                                           104.81
                                                                     734.02
                                    105.22
                                               796.36
                                                                       806.2
                                                                                            819.32
   756.99
               105.1
                                                          105.09
                                                                                 105.24
              105.32
105.27
                        865.25
999.76
                                    105.31 875.09
105.41 1019.44
                                                          105.47
105.37
                                                                    904.62
1055.53
                                                                                 105.33
   839.01
                                                                                            953.83
```

1078.5

105.08 1134.27 104.53 1209.72

105.1 1275.34

104.94 1337.67

104.76 1387.48

104.76 2941.93 107.62 2981.28

110.45 3010.79 107.03 3037.03

109.44 3073.1 110.74 3109.17 111.64 3155.08

111.27 3194.43 111.9 3233.78

110.34 3302.64 108.94 3358.39

106.88 3387.9 110.64 3437.09 109.75 3505.96

107 3555.14 106.33 3617.45

104.62 3719.1 107.82 3765.01

105.19 3810.92 105.23 3860.11

110.37 3896.18

111.06 3942.09 109.62 4027.35

110.31 4089.65 109.58 4115.89

109.58 4115.89 109.26 4168.36 108.66 4214.27 108.32 4253.63 109.74 4302.82 107.84 4361.85

108.39 4407.77 107.62 4453.68

107.46 4509.43 107.37 4558.63

108 24 4663 57

108.35 4716.05 108.3 4765.24

108.4 4866.91 108.79 4912.82

110

105.75

104 45

108.9

109.2

108.06

108 25

986.64

1091.62 1160.51 1216.29

1357.35

1392.48 2948.49

2984.56 3014.07

3043 59

3115.73 3161.64 3197.71

3250.18 3319.04

3364 95

3446.93

3561.7

3633.84

3771.57

3866.67

3899.46

3948.65

4040.47

4092.93

4125.73

4184.75 4224.11

4315.94

4371.69

4417.6

4460.24

4594 7

4729.17 4778.36

4876.75

4919.38

105 1098.18 104.94 1176.92

104.02 1229.41

105.51 1301.58

110.6 2987.84 108.9 3020.63

108.44 3046.87

108.44 3046.87 107.7 3086.22 111.52 3125.57 111.23 3171.48 109.72 3204.27

110.37 3256.74 109.87 3341.99

110.36 3469.88

108.26 3528.91 105.2 3571.54

104.58 3656.8 106.2 3735.5

107.64 3781.41 104.58 3837.16

108.03 3873.23

112.15 3909.3 111.06 3968.32

111.06 3968.32 109.57 4053.58 109.3 4096.21 107.52 4135.56 108.24 4191.31 109.14 4233.95

108.54 4270.02 108.85 4325.78

107.8 4381.53 107.61 4427.44

107.79 4483.2 107.34 4529.11

107.71 4611.1 108.45 4673.41 108.15 4739.01

107.81 4791.48 108.67 4880.03

107.32 4925.94

107.9 3371.51 109.61 3407.58

1367.2 89.64 1722.48 105.77 2964.89

105.92

105.18 1111.3 104.74 1183.48

104.19 1249.09

105.36 1311.43 106.12 1373.76

89.64 1727.48 107.79 2971.44

111.26 2994.4 107.86 3023.91

108.56 3056.7 107.76 3092.78 112.12 3135.4 111.33 3178.03 110.96 3207.55

110.12 3276.41 108.39 3345.27 108.63 3381.35

110.55 3414.14 109.97 3476.44

107.82 3542.03 106 3581.38

104.65 3686.31 107.82 3738.78

107.82 3738.78 106.34 3787.97 104.47 3843.71 107.98 3883.06 112.53 3925.69 111.06 3984.72

109.19 4073.26 107.93 4102.77

108.15 4142.12

109.23 4197.87

108.45 4240.51

110.39 4276.58 108.16 4342.17

108.16 4342.17 108.05 4391.37 108 4434 107.69 4486.48 107.48 4538.95

108.18 4617.66 108.29 4686.53 108.3 4745.56

107.98 4817.72 108.82 4893.15

107.25 4935.78

3056 7

108.56

105.05 1124.43 104.77 1199.88

104.98 1331.11 105.46 1386.88

103.64 2938.65 107.39 2974.72

110.62 3000.96 107.97 3033.75 108.07 3063.26

108.84 3102.61 111.27 3145.24

111.61 3184.59 111.29 3220.66

110.08 3282.97 108.28 3351.83

106.93 3384.62 110.71 3430.53 109.74 3492.84

107.74 3548.58 106.07 3591.21

104.43 3715.82 108.09 3751.9

106.29 3797.8 104.58 3850.27

109.58 3889.62

111.68 3935.53 110.59 4010.95

109.55 4083.1 109.43 4106.05

108.24 4155.24 108.66 4201.15 108.67 4247.07

110.52 4286.42 108.12 4348.73

108.06 4401.21 107.96 4440.56

107.5 4502.87 107.3 4548.79

108.22 4706.21 108.06 4755.4

107.85 4837.39 108.43 4899.71

107.57 4945.62 107.42 4962.02 108.66 4994.81 108.08 5007.93

108 4643 9

1265.5

104.86

```
109.08 5060.41
                                         108.63 5047.29
                                                                                            109.08 5066.96
                                                                  109.51 5145.67
110.3 5181.75
114.69 5204.71
               109.26 5112.88
109.59 5175.19
                                         109.26 5135.84
                                                                                            109.29 5165.35 109.76
113.1 5185.03 114.9
                                                                                           114.58 5207.99
111.9 5247.34
 5188.31
                115.69 5191.59
                                         115.66 5198.15
               114.76 5217.83
112.97 5267.02
                                                                    111.9 5237.5
111.8 5280.14
                                         112.15 5221.11
                                                                                            112.38
   5253.9
                                         112.71 5276.86
                                                                                                       5286.7
 5289.98
5345.73
               119.26 5293.26
118.67 5358.85
                                         119.47 5309.65
118.54 5365.41
                                                                   119.1 5312.93
119.08 5375.25
                                                                                            118.59 5319.49
119.13 5385.08
                                                                                                                      118.64
               118.6 5404.76
119.7 5463.8
122.83 5532.67
                                        118.74 5365.41
118.76 5431
120.4 5486.75
123.64 5545.79
121.75 5575.3
126.91 5640.89
   5398.2
                                                                  118.64 5437.56
121.47 5496.59
                                                                                            119.32 5444.12
121.55 5512.99
                                                                   123.88 5552.34
121.53 5585.14
127.87 5650.73
 5519.55
                                                                                            124.28 5565.46
               122.83 5332.07
123.44 5572.02
126.48 5608.1
127.83 5699.93
                                                                                           124.96 5591.7
127.9 5670.41
 5598.26
                                                                                           127.97 5762.24
129.01 5827.83
                                         128.24 5709.76
128.63 5804.87
 5693.37
                                                                   127.89 5749.12
 5788.48
                128.41 5795.03
                                                                   128.55 5814.71
                                                                                                                      130.21
               130.72 5854.07
134.23 5929.5
133.13 5998.37
133.46 6060.68
 5837.67
                                         132 5863.91
133.81 5936.06
                                                                   133.85 5877.02
133.86 5959.01
                                                                                            133.97 5893.42
133.6 5975.41
                                         133.28 6004.93
133.9 6070.52
134.01 6113.15
                                                                  133.11 6021.33
134.33 6080.36
134.65 6119.71
                                                                                            133.46 6031.17
134.36 6086.92
136.78 6129.55
 5988.53
 6100.04
                134.34 6109.88
                                                                                                                      137.96
 6136.11
               138.19 6159.07
135.68 6204.98
                                         138.39 6178.75
135.64 6211.54
                                                                  138.35 6188.59
136.76 6237.78
                                                                                            138.16 6195.14
136.19 6257.46
                                                                                            136.19 6257.46
135.89 6316.49
135.5 6395.2
135.73 6457.51
136.08 6529.66
136.51 6628.05
137.45 6690.36
137.93 6759.23
                                         136.21 6296.81
136.16 6362.4
135.59 6431.28
 6264.02
6323.05
               135.44 6286.97
136.09 6342.73
                                                                   135.81 6306.65
135.88 6372.24
                                                                  135.48 6372.24
135.47 6441.11
136 6513.27
136.27 6605.09
137.46 6687.08
137.83 6742.84
137.78 6814.99
               135.45 6424.72
135.57 6487.03
136.06 6542.78
 6418.16
                                                                                                                      135.73
                                         135.83 6490.31
136.05 6565.74
 6532.94
                                                                                                                      136.55
                                         136.86 6673.97
137.39 6726.44
137.83 6805.15
 6647.73
               136.5 6667.41
137.25 6719.88
 6706.76
               138.17 6775.63
 6769 07
                                                                                            139 04 6824 83
 6834.67 138.7 6860.9
6896.98 136.36 6903.54
6926.49 136.98 6933.05
                                         138.32 6864.18
                                                                    138.1
                                                                                6877.3
                                                                                            138.12 6887.14
                                                                 135.87 6913.38
135.73 6939.61
                                        136.57 6910.1
136.48 6936.33
                                                                                            135.99 6919.93
135.98 6946.17
 6949.45 137.55 6959.29
                                         137.35 6972.41
                                                                  139.01 6995.37
                                                                                            139.79 6998.65
                                                                                                                     140.03
Manning's n Values
                                         num=
                                                                  n Val
              n Val Sta
.188 1311.43
                                        n Val Sta
.066 1387.48
                                                                                             n Val
                                                                   .015 1727.48
                                                                                              .066 2938.65
                                                                                                                        .187
                          Right
                                         Lengths: Left Channel
                                                                                Right
                                                                                               Coeff Contr.
                                                                                                                        Expan.
1367.2 1727.48 2629.05 610.25 109.21
Left Levee Station= 38.83 Elevation= 123.31
Right Levee Station= 6824.83 Elevation= 139.4
| Blocked Obstructions | num= 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | O | 1295.88 | 105.92 | 2987.95 | 5489.96 | 111.28
CROSS SECTION OUTPUT Profile #Design Flow
                                        124.16
   E.G. Elev (ft)
                                                                                                    Left OB
                                                            Element
                                                                                                                      Channel
                                                                                                                                       Right OB
                                                           Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Plow (cfs)
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                                                    0.173
2629.05
                                                                                                                        0.015
610.25
                                                                                                                                       0.093
                                            114 16
                                                                                                   20967.38
                                                                                                                    11355.51
                                                                                                                                      48118 00
                                                                                                    20967.38 11355.51 4
16495.30 155323.20
                                                                                                                                      48118.00
   O Total (cfs)
                                         235000.00
                                                             Flow (cfs)
                                                                                                                                         63181.53
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                            Top Width (ft)
                                                           Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                              2.92
                                                                                                         0.79
                                                                                                                        13.68
                                                                                                                                           1.31
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                              32 59
                                                                                                       15 96
                                                                                                                         31 52
                                                                                                                                           12.69
                                                                                                      1138981.0
                                                                                                                         10724880.0
                                         16226470.0
                                                                                                                                              4362608.0
                                                                                                                       380.73
                                                                                                                                        3798.09
                                            612.96
                                                                                                    1316.93
   Min Ch El (ft)
                                                                                                     0.21
                                                                                                                                            0.17
   Alpha
                                             14.55
                                                                                                         0.16
                                                                                                                           5.34
                                                                                                                                            0.22
                                                           Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                                      69679.45
2858.71
                                                                                                   186243.10
                                                                                                                                     25419.66
   C & E Loss (ft)
                                                                                                  22896.44
                                               0.39
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
              sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
              Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used
Note:
CROSS SECTION
RIVER: Rio Grande
                                        RS: 169.83
REACH: Lower Reach
Description: Added blocked obstruction not in original, Bathymetric elevations
                    translated from IBWC 2008 Cross-sections
Station Elevation Data
Sta Elev Sta
0 126.62 6.55
                                         num=
                                                       452
      Sta Elev
0 126.62
36.01 121.92
                                                         Sta
13.1
                                        126.77
                                                                 126.69
115.35
111.95
                                                                               19.64 126.94 22.92 126.39
55.66 114.3 62.21 112.92
94.94 111.79 117.86 111.64
                                                       52.38
81.85
     36.01
                             42.56
                                         118.93
    68.75 112.04
                                75.3
                                         111.73
   130.96
               111.81
110.37
                            157.15
245.55
                                         111.64
110.27
                                                     183.34
271.74
                                                                   110.85
                                                                              202.99
                                                                                            110.46
                                                                   110.69
                                                                                304.48
                                                                                            110.62
               110.6
111.38
                            340.49
441.98
                                         110.47
111.04
                                                                  110.45
110.94
                                                                               386.33
474.72
   333 94
                                                      353.59
                                                                                            110.68
                                                                                                         412.52
                                                      455.08
497.64
                                                                                            110.93
                                                                                            112.43 550.02
   484.54
                112.21
                            491.09
                                         112.56
                                                                   112.64
                                                                                 540.2
               111.16
111.07
                            592.59
635.15
                                         111.47
111.15
                                                      599.13
648.24
                                                                               608.96
661.34
   559.85
                                                                                            111.16
                                                                   111.02
                                                                                                         667.89
   625.33
                                                                                             111.1
                            680.98
769.38
847.96
                                                                               703.9
795.57
893.79
   674.43
749.74
               111.7
111.24
                                         111.6
111.55
                                                      694.08
789.02
                                                                  110.99
                                                                                            110.98
111.46
                                                                                                         720.27
811.94
                                                                                            110.94
112.88
   825.04
                110.89
                                         111.29
                                                      864.33
                                                                   111.03
                                                                                                         900.34
                                                                                                                      111.18
                112.11
                            926.53
                                                                                939.63
   910.16
                                          113.1
                                                      933.08
                                                                   113.11
                                                                                                         946.17
```

952.72

1412.25 1431.72

1467.41

1506.64 1558.97

1594 95

1693.08

1761.77

1810.84

1872.99

111.95

104.76

110.26 1444.7 107.63 1473.93

110.05 1516.45

108.96 1568.78

111.06 1604.76

110.83 1650.56 110.73 1702.89

108.8 1768.31 110.47 1827.19

962.54

988.74 1415.5

109.11 1882.8 109.17 1889.34 110.08 1938.41 108.75 1941.68

111.78

972.37

106.44 992.01 104.92 1418.74

110.17 1447.94 109.15 1477.2

109.87 1522.99 109.48 1578.6 111.17 1621.12

110.6 1709.44

107.66 1778.13 110.6 1837

111.93

109.86

104.76 994 106.62 1421.99 109.8 1457.68 109.59 1483.74

108.93 1536.07

109.66 1581.87

110.34 1630.93

110.82 1670.18 110.72 1729.06 107.77 1794.48 110.01 1843.55

975.64

111.8

982.19

1859.9

110 76

109.74

100.84 1244 108.99 1425.23 107.31 1460.92 109.82 1496.82

108.73 1549.16

110.94 1637.47

110.51 1751.96

109.86 1804.29 109.77 1859.9

109.86 1905.7 110.34 1925.32 110.44 108.4 1948.22 108.42 1954.76 107.96

```
108.46 1990.74
  2013.64
                        105.96 2020.18
                                                             104.69 2023.45
                                                                                                   104.48 2033.26
                                                                                                                                         104.53 2062.7
                                                                                                                                                                               104.37
                                                              104.41 2121.58
  2147.75
                        104.97 2154.29
                                                             104.91 2164.1
                                                                                                     104.6 2170.64
                                                                                                                                         104.89 2173.91
                                                                                                                                                                               105.54
                                                                                                                                        107.97 2209.89
107.27 2262.23
106.7 2314.56
107.94 2373.44
                                                             108.02 2193.54
107.32 2232.79
                                                                                                     107.9 2203.35
107.6 2245.87
   2180.45
                                               2187
                        107.89 2222.98
  2216.43
                                                                                                   106.61 2311.29
108.06 2366.9
108.34 2422.5
                       106.92 2288.39
107.55 2340.73
                                                             106.81 2298.21
107.55 2353.81
  2334.19
                                                             108.23 2409.42
108.48 2471.57
108.91 2517.36
108.71 2573.07
108.92 2628.82
  2383.25
                        108.69 2399.61
                                                                                                                                         107.7 2432.31
108.43 2491.19
                                                                                                   108.23 2484.03
108.71 2530.44
108.53 2592.74
108.81 2648.49
                                                                                                                                         108.79 2533.71
108.78 2605.86
108.82 2655.05
                        108.75 2507.55
         2501
                       108.88 2553.39
108.92 2625.54
  2543.55
  2612.42
                                                                                                                                                                                 108.5
                                                             109.33 2674.73
108.2 2710.8
                                                                                                                                         109.13 2687.84
108.41 2723.92
                                                                                                   109.09 2681.29
108.02 2717.36
  2658.33
                        108.59 2668.17
                        109.45 2707.52
  2697.68
                                                            108.2 2710.8
108.39 2756.71
107.35 2796.07
107.1 2848.54
107.15 2927.24
107.67 2986.27
                                                                                                  108.02 2717.36 108.41 2723.92 109.19 107.55 2763.27 107.58 2773.11 107.26 107.59 2805.9 107.66 2812.46 107.55 107.43 2858.37 107.03 2887.89 107.66 107.38 2937.08 107.17 2956.76 107.48 107.6 2996.11 107.72 3009.23 108.06 108.12 3061.7 108.42 3071.54 108.25 108.34 3101.05 108.15 3107.61 108.26 108.11 108.26 108.11 108.26 108.12 108.26 108.27 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108.28 108
                       108.47 2740.32
107.44 2792.79
107.23 2832.14
107.19 2920.68
107.45 2979.71
  2730.48
  2819.02
  2966.59
  3019.06
3078.09
                       108.03 3028.9
108.34 3087.93
                                                             108.36 3042.02
108.17 3094.49
                                                             107.96 3143.68
108.04 3196.15
                       108.23 3133.84
107.89 3186.31
                                                                                                   108.11 3163.36
107.59 3212.55
                                                                                                                                         107.9 3169.92
107.11 3219.11
  3124.01
   3176.48
                                                                                                  107.59 3212.55
108.33 3265.02
107.93 3314.21
108.5 3399.48
109.33 3481.46
108.94 3527.37
115.7 3553.61
111.99 3592.96
                       108.17 3245.34
108.7 3301.09
108.04 3369.96
                                                                                                                                         108.56 3281.42
107.96 3320.77
108.67 3409.31
  3232.23
                                                             108.08 3251.9
                                                             108.34 3307.65
108.59 3376.52
   3333.89
                                                             109.33 3468.34
109.93 3524.09
   3435.55
                       109.05 3461.78
109.73 3520.81
                                                                                                                                         109.55 3488.02
108.81 3533.93
   3510.98
                       113.83 3543.77
                                                             115.37 3547.05
112.52 3576.56
                                                                                                                                        114.71 3560.17
111.87 3596.24
   3537.21
                      113.83 3543.77
114.7 3573.28
112.72 3609.36
116.95 3645.43
118.3 3707.74
119.31 3773.33
120.54 3825.8
121.02 3858.59
  3566.73
                                                                                                  111.67 3632.31 112.18 3635.59
118.62 3665.11 118.88 3671.67
118.82 3730.7 119 3750.37
119.53 3789.72 119.55 3802.84
118.77 3835.64 118.63 3838.92
  3602.8
3642.15
                                                             112.51 3625.75
118.26 3648.71
                                                                                                                                                                               112.52
                                                            118.39 3717.58
119.24 3779.89
120.41 3832.36
121.62 3865.15
123.45 3914.34
124.39 3966.81
  3694.62
3766.77
                                                                                                                                        119.55 3802.84
118.63 3838.92
122.33 3878.27
123.63 3930.74
   3819.24
                                                                                                   121.71 3874.99
123.64 3924.18
   3848 75
                       123 3904.5
124.37 3960.25
   3891.39
   3953.69
                                                                                                   124.85 3973.37
                                                                                                                                         124.35 3979.93
                       124.37 3960.25
125.13 3996.33
127.85 4065.19
128.45 4124.22
128.47 4173.42
                                                            124.39 3960.81
126.92 3999.61
127.84 4078.31
128.03 4137.34
128.5 4186.53
                                                                                                  124.85 3973.37
127.31 4009.44
127.91 4091.43
127.82 4143.9
128.85 4196.37
                                                                                                                                         128.17 4114.39
128.04 4157.02
128.76 4209.49
  4042.24
  4163.58
                       128.75 4245.56
130.57 4294.76
133.52 4353.79
133.07 4406.26
                                                            128.83 4258.68
131.84 4298.03
133.23 4363.62
132.9 4425.93
                                                                                                                                       130.13 4281.64
132.52 4324.27
133.3 4386.58
133.07 4439.05
  4216.05
4288.2
                                                                                                    129.1 4271.8
132.1 4311.15
                                                                                                 133.14 4373.46
132.7 4435.77
  4343.95
     4399.7
                       133.44 4458.73
133.66 4517.76
135.39 4580.07
132.99 4612.86
133.59 4662.05
                                                             132.9 4425.93
133.73 4465.29
133.79 4537.43
134.59 4583.35
132.89 4619.42
133.56 4668.61
                                                                                                   133.65 4488.24
133.64 4553.83
133.47 4589.9
                                                                                                                                         133.78 4494.8
133.99 4563.67
  4445.61
  4511.2
4573.51
                                                                                                                                         133.99 4563.67
132.24 4596.46
132.89 4635.82
133.62 4685.01
                                                                                                   132.42 4629.26
133.38 4675.17
    4606.3
   4652.21
                       134.9 4707.96
134.51 4757.15
133.91 4806.35
  4694 85
                                                             135.02 4714.52
                                                                                                   134.92 4724.36
                                                                                                                                         134.56 4740.76
                                                             134.76 4763.71
134.48 4816.18
                                                                                                   134.58 4776.83
134.11 4832.58
  4796.51
                                                                                                                                         133.96 4845.7
                                                                                                                                                                               133.67
                                                             134.49 4871.93
135.11 4934.24
135.77 4999.83
136.3 5049.02
                       133.67 4868.65
135.43 4917.85
                                                                                                    134.32 4878.49
                                                                                                                                          135.05 4885.05
  4898.17
                                                                                                   135.36 4953.92
                                                                                                                                         135.89 4963.76
                                                                                                                                                                               135.81
  4970 32
                       135.94 4986.71
135.24 5042.46
                                                                                                   135.85 5006.39
136.59 5062.14
                                                                                                                                         135.02 5009.67
136.86 5068.7
   5029.35
                     136.98 5111.33
137.35 5167.08
137.69 5242.51
                                                                                                  137.17 5144.13
137.1 5206.43
                                                                                                                                         136.93 5153.96
136.72 5219.55
  5081 82
                                                               137.2 5137.57
                                                             136.83 5173.64
136.02 5245.79
   5160.52
                                                                                                  135.56 5258.91
  5235.95
                                                                                                                                         135.31 5265.46
                          136.4 5278.58
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val
0 .188 975.64 .066 982.19 .015
                                                                                                                                         n Val
                                                                                                                     1244
                                                                                                                                             .066 1431.72
Bank Sta: Left Right Lengths: Left Channel
                                                                                                                                           Coeff Contr.
                                                                                                                      Right
                                                                                                                                                                               Expan.
972.37 1431.72 1276.91 1300 905.72

Left Levee Station= 19.64 Elevation= 126.94

Right Levee Station= 5235.95 Elevation= 137.69
CROSS SECTION OUTPUT Profile #Design Flow
                                                  123.57
                                                                                         Element
Wt. n-Val.
                                                                                                                                                                                                         Right OB
                                                                                                                                                         0.188
     Vel Head (ft)
                                                                     0.62
                                                                                                                                                                                   0.043
    W.S. Elev (ft)
Crit W.S. (ft)
                                                             122.96
                                                                                         Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                                                    1276.91
                                                                                                                                                                                                           905.72
                                                                                                                                                                               1300.00
                                                                                                                                                                               9520.81
                                                                                                                                                                                                       31582.67
                                                                                        Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
    E.G. Slope (ft/ft) 0.000960
Q Total (cfs) 130000.00
                                                                                                                                                     9169 27
                                                                                                                                                                               9520 81
                                                                                                                                                                                                       31582 67
    E.G. Slope (it/it)
Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                               3857.52
                                                                                                                                                      939.40
                                                                                                                                                                                 459.35
                                                                                                                                                                                                          2458.77
                                                                      2.59
                                                                                                                                                                                     8.11
                                                                                                                                                                                    20.73
                                                                                                                                                                                                              12.84
    Conv. Total (cfs)
Length Wtd. (ft)
                                                             4195514.0
                                                                                         Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                    330582.2
941.18
                                                                                                                                                                               2490780.0
                                                                                                                                                                                                           1374152.0
                                                              1193.33
                                                                                                                                                                               464.67
    Min Ch El (ft)
                                                                                         Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                         0.58
                                                                                                                                                                                 1.23
9.96
                                                                 100.84
                                                                                                                                                                                                                0.77
    Alpha
    Frctn Loss (ft)
                                                                                         Cum Volume (acre-ft)
                                                                                                                                                  185333.70
                                                                      0.57
                                                                                                                                                                               69533.21
                                                                                                                                                                                                         213990.30
                                                                                         Cum SA (acres)
                                                                                                                                                                               2852.97
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
                    1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.
Note:
                     Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                                             RS: 169.49
Description: revised reach length to 1300, Bathymetric elevations translated
                               from IBWC 2008 Cross-sections
Station Elevation Data num=
Sta Elev Sta Elev
0 126.44 3.28 113.11
                                                                              459
                                                                                      Sta
                                                                                                        Elev
```

9.83 111.02 16.39 109.99

6.56 111.89

| 1737.15
1776.52
1842.13
1842.13
1842.78
1930.71
1960.24
1976.64
2006.17
2032.42
2065.23
2098.03
2127.56
2163.65
2183.33
2222.7
2265.35
2304.72
2337.53
2386.74
2445.8
2475.32
2504.85
2570.46
2570.46
2570.46
2570.91
2787
2823.08
2822.14
2911.67
2957.6
2990.4
3052.74
3101.95
3180.69
3220.06 | 92.43
99.22
106.71
108.84
108.77
107.83
108.88
108.97
108.03
108.11
108.03
108.11
108.59
108.11
109.71
109.54
110.36
111.39
114.33
114.54
112.06
112.06
113.96
114.33
114.54
114.21
113.96
115.68
117.95
119.61
122.36
114.33
114.54
114.21
113.96
115.68
117.95
119.61
122.36
131.87
122.81
122.81
122.81
123.95
124.48
127.96
128.58
129.06
130.25
131.11
132.96
130.25
131.11
132.96
130.25
131.11
132.96
130.25
131.11
132.96
132.96
133.96
133.96
133.96
134.33
134.64
132.83
131.06
132.83
131.06
132.83
131.06 | 85. 23
114.73
150.78
190.12
252.4
291.73
340.9
416.29
472.02
534.33
563.8
603.13
655.58
701.47
721.14
737.14
4737.14
1066.14
1133.14
1176.14
1278.1
1314.11
1343.56
1373.02
1383.14
1176.14
1278.1
1314.11
1343.56
1373.02
1383.14
177.96
166.12
177.03
185.56
179.03
185.56
187.03
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187.03 | 88.5 98.8 99.2 107.51 108.95 108.97 108.57 108.84 109.33 108.05 108.11 108.11 108.21 1 | 722.14 744.14 744.14 810.14 846.14 1011.14 1146.14 1187.14 1284.65 1320.65 1350.65 1350.65 1350.65 1412.35 1481.24 1507.49 1543.58 1450.74 1648.29 1750.27 1806.04 1861.82 1894.62 1947.12 1966.81 1989.77 2016.01 2042.66 2075.07 2107.88 2416.27 2465.48 242.37 2524.23 2416.27 2465.48 2442.27 2465.48 2491.73 2521.25 2544.22 2580.31 2626.24 2491.73 2521.25 2544.22 2580.31 2626.24 2491.73 2521.25 2544.22 2580.31 2626.24 2491.73 2521.25 2544.22 2580.31 2626.24 2491.73 2521.25 2544.22 2796.84 28491.73 2718.11 2767.31 27796.84 28491.73 2718.11 2767.31 2796.84 28491.73 2718.31 2626.24 2491.73 251.25 2544.22 2580.31 2626.24 2491.73 251.25 2544.22 2580.31 2626.24 2491.73 251.25 2544.22 2580.31 2626.24 2491.73 251.25 2544.22 2580.31 2626.24 2491.73 251.35 2554.25 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2554.35 2555.52 | 88.3 99.47 100.1 108.56 107.83 107.76 108.89 109.33 108.06 108.22 108.82 107.15 108.43 108.04 1108.23 108.04 109.12 109.71 110.46 109.51 114.44 111.81 112.54 114.26 114.37 114.62 113.45 118.1 121.49 122.15 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.54 128.55 128.55 128.54 128.57 131.03 131.77 131.03 131.77 132.84 132.99 132.38 | 95.06 134.39 206.51 265.51 304.84 360.57 439.24 498.24 544.13 576.91 629.35 681.88 711.3 726.14 7747.14 854.14 814.14 814.14 1099.14 1147.14 1261.74 1297.74 1237.74 1245.37 1461.56 148.56 148.56 1717.66 1717.66 1759.35 1622.32 1648.56 1717.46 1763.39 1822.45 1871.66 1993.05 2022.88 2045.54 2081.63 217.72 2248.95 2291.62 2248.95 2291.62 2248.95 2291.62 2324.41 2373.62 2248.95 2291.62 2324.41 2373.62 2324.41 | 89 99.6 104.76 109.1 108.18 107.6 108.83 108.16 107.91 108.58 108.56 108.87 107.51 108.19 108.20 111.79 111.79 111.79 112.60 114.46 114.47 113.75 112.92 122.25 111.79 114.46 114.77 113.75 122.59 124.31 121.92 122.25 120.64 131.79 | 2875.58
2908.38
2951.03
2983.84
3016.65
3046.18
3088.83
3134.76
3170.85
3213.5
3252.87
3205.36 | 130.05
130.89
132.43
132.01
131.78
131.55
131.54
131.53
131.48
132.44
132.15
130.6
133.25 | |
|--|--|--|--|--|---|---|---|---|---|--|
| 35/4.38 | 135.67 | 3541.57
3580.94
3630.15
3666.24 | 135.86 | 3643.28 | 135.73 | 3646.56 | 135.49 | 3656.4 | 134.2 | |
| Manning's
Sta
0
2639.36 | n Value
n Val
.066 | es
Sta
752.14 | num=
n Val
.025 | 6
Sta
1117.14 | n Val
.085 | Sta
1455 | n Val | Sta
1917.59 | n Val
.06 | |
| | | Right
1278.1 | Lengths | s: Left C
188.88 1 | hannel
.299.95 1 | Right
L556.14 | Coeff | Contr. | Expan. | |
| Bank Sta: Ineffecti Sta L 0 1278.1 Left Leve Right Lev CROSS SEC | TION OU | TPUT Pro | file #De | esign Flo | w | | | | | plobs |
| E.G. El
Vel Hea
W.S. El
Crit W. | ev (ft)
d (ft)
ev (ft)
S. (ft) | | 122.9
0.2
122.6
103.2 | ou Ele
27 Wt.
53 Rea
20 Flo | n-Val.
ch Len.
w Area (| (ft)
(sq ft) | 1
89 | Jert OB
0.066
188.88
922.33 | 0.049
1299.95
17399.65 | Right OB
0.064
1556.14
13099.50 |

```
E.G. Slope (ft/ft)
                                              Area (sq ft)
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                               130000.00
                                                Flow (cfs)
                                                                             18095.71
                                                                                           85803.55
                                                                                                        26100.74
                                              Top Width (ft)
                                    3.30
                                              Avg. Vel. (ft/s)
                                                                                2.03
                                                                                              4.93
                                                                                                           1.99
                                 38.33
                                                                               12.56
                                                                                            30.70
                                              Hydr. Depth (ft)
  Conv. Total (cfs)
Length Wtd. (ft)
                                7738974.0
                                                Conv. (cfs)
                                                                             1077248.0 5107935.0
                                                                                                           1553792.0
                                                                                            575.61
                                 1248.34
                                                                               718.46
                                                                                                        1246.59
  Min Ch El (ft)
                                                                                                         0.19
                                              Shear (lb/sq ft)
                                                                                 0.22
                                   84.30
  Alpha
Frctn Loss (ft)
                                    1.60
                                              Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                 0.44
                                                                                               2.63
                                                                                                            0.37
                                                                                                      25373.39
  C & E Loss (ft)
                                    0.04
                                              Cum SA (acres)
                                                                            22804.27
                                                                                           2837.66
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
           1.4. This may indicate the need for additional cross sections. Manning's n values were composited to a single value in the main channel.
           Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
Description: Left bank elevations updated to match surface elevation of 126.70.
               Original IBWC Cross-section data applied to this section
Station Elevation Data num=
  Sta Elev Sta Elev
4000 126.7 4067 126.7
4623.8 124.74 4723.8 124.74
                                             Sta
                                                      Elev
                                                                         Elev
                                                   126.7
                                                                       84.64 4623.8 84.64
                                            4100
                                                              4100
Manning's n Values
                                ทเมฑ=
     Sta n Val Sta
4000 .048 4067
                               n Val
                                           Sta n Val Sta
4100 .015 4623.8
                                                                        n Val
                                 .06
                                                                           .06
Bank Sta: Left Right 4100 4623.8
                               Lengths: Left Channel
                               48.38 50.04 47.52
4000 Elevati
                                                                         Coeff Contr.
                                                                                            Expan.
                                             Elevation= 126.7
Elevation= 124.74
               Station= 4000
Station= 4723.8
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                             122.75
                                                                              Left OB
                                                                                            Channel Right OB
                                              Element
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                              Wt. n-Val.
Reach Len. (ft)
                                    0.68
                                                                                             0.015
                               122.07
                                                                                             50.04
                                   97.06
                                              Flow Area (sq ft)
Area (sq ft)
                                                                                          19605.04
                           0.000043
  E.G. Slope (ft/ft)
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                           130000.00
                               130000.00
                                                Flow (cfs)
                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                            523.80
                                523.80
                                   6.63
                                                                                              6.63
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                   37 43
                                                                                             37 43
                                                                                            19879180.0
                                   50.04
                                                                                            598.66
                                              Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
  Alpha
                                    1.00
                                                                                               0.58
                                                                                                         213291.70
  Frctn Loss (ft)
                                               Cum Volume (acre-ft)
                                                                           185049.20
                                                                                                      25351.26
                                              Cum SA (acres)
                                                                                           2821.38
  C & E Loss (ft)
                                                                           22802.73
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
INLINE STRUCTURE
RIVER: Rio Grande
REACH: Lower Reach
                               RS: 169.13
Description: Anzalduas Dam
Distance from Upstream XS =
                                       3.0
Deck/Roadway Width =
Weir Coefficient =
Weir Embankment Coordinates
                                      num =
     Sta Elev Sta Elev
4100 124.64 4623.8 124.64
Upstream Embankment side slope
Downstream Embankment side slope
                                                               0 horiz. to 1.0 vertical 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = Elevation at which weir flow begins =
                                                             .98
Weir crest shape
                                                      = Ogee
INLINE STRUCTURE GATE Gate #1
       Height
       Width
       Invert
Gate Type
                                  84.64
                            = Radial
                                              Radial Coefficient=
       Trunion Exponent = .16
Opening Exponent = .72
       Head Exponent
Trunion Height
                                     .62
                                 3.21
Weir Coefficient - ....
Weir crest shape = Ogee
Number of Gate Openings = 6
  4137.5 4227.26 4317.02 4406.78 4496.54 4586.3
CROSS SECTION
RIVER: Rio Grande
                               RS: 169.12
Description: Original IBWC Cross-section data applied to this section
```

Station Elevation Data num= Sta Elev Sta Elev

4100 122.84

Sta E.c. 0 122.84

6 Sta

Sta

4100 72.14 4623.8 72.14 4623.8 128.54

Elev

Elev

```
Manning's n Values
         .. valu
sta n Val
0 ^
                                      n Val
                               Sta
                  .06
                                          .015 4623.8
                             4100

        Bank Sta: Left
        Right 4100
        Lengths: Left Channel
        Right 96.53

        Left Levee
        Station=
        0
        Elevation=
        122.84

        Right Levee
        Station=
        4723.8
        Elevation=
        128.54

                                                                                            Coeff Contr.
                                                                                                                   Expan.
CROSS SECTION OUTPUT Profile #Design Flow
                                  121.07
                                                                                                 Left OB Channel Right OB
   E.G. Elev (ft)
                                                          Element
                                                          Wt. n-Val.
Reach Len. (ft)
   Vel Head (ft)
                                              0.41
                                                                                                                     0.015
   W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                       120.66
                                                                                                  100.93
                                                                                                                     99.44
                                             84.56
                                                         Flow Area (sq ft)
Area (sq ft)
                                                                                                                25416.00
                                       0.000019
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                      130000.00
                                                            Flow (cfs)
                                                                                                                  130000.00
                                                         Top Width (ft)
                                                         Top Width (tt)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (ofs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
Cum S, (acres)
                                             5.11
                                                                                                                       5.11
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                             48 52
                                                                                                                     48 52
                                        29906180.0
                                                                                                                    29906180.0
                                            99.44
72.14
   Alpha
Frctn Loss (ft)
                                              1.00
                                                                                                                       0.25
                                                                                               185049.20
                                                                                                                                   213291.70
   C & E Loss (ft)
                                             0.02
                                                        Cum SA (acres)
                                                                                               22802.73
                                                                                                                  2820.78 25351.26
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                       RS: 169.1
REACH: Lower Reach
Description: Original IBWC Cross-section data applied to this section
                           Data num=
Sta Elev
Station Elevation Data
       Sta Elev
0 122.84
                 Elev
                                                         Sta
                                                                   Elev
                                                                                                                     Elev
        0 122.84
757 108.14
                                                         100 108.14
857 128.54
                                758 128.54
Manning's n Values
                                       num=
                                       n Val
       Sta n Val
0 .14
                 n Val Sta
                                                         Sta n Val
Bank Sta: Left Right
99 758
Left Levee Station=
Right Levee Station=
                                       Lengths: Left Channel Right 1118.21 1200.01 1232.42 0 Elevation= 122.84
                                                                                          Coeff Contr.
                                                                                                                    Expan.
                                                   Elevation= 122.84
Elevation= 128.54
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                Left OB
                                                                                                                  Channel
   Vel Head (ft)
                                             0.49
                                                          Wt. n-Val.
                                                                                                                     0.015
                                       120.55
95.38
                                                                                                1118.21
   W.S. Elev (ft)
Crit W.S. (ft)
                                                          Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                  1200.01
                                                                                                                23036.52
                                                          Area (sq ft)
Flow (cfs)
   E.G. Slope (ft/ft)
                                       0 000030
                                                                                                                23036 52
   Q Total (cfs)
                                       130000.00
                                                         Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
   Top Width (ft)
Vel Total (ft/s)
                                           658.45
                                                                                                                    658.45
                                           5.64
36.91
   Max Chl Doth (ft)
                                                                                                                     34.99
                                       23587410.0
1191.97
83.64
   Conv. Total (cfs)
Length Wtd. (ft)
                                                          Conv. (cfs)
Wetted Per. (ft)
                                                                                                                    23587410.0
                                                                                                                    693.23
                                                          Shear (lb/sq ft)
Stream Power (lb/ft s)
   Min Ch El (ft)
                                                                                                                      0.06
                                              1.00
                                                                                                                       0.36
   Alpha
   Frctn Loss (ft)
                                              0.10
                                                          Cum Volume (acre-ft)
                                                                                               185049.20
                                                                                                                  68504.10
                                                                                                                                   213291.70
                                                          Cum SA (acres)
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
RIVER: Rio Grande
REACH: Lower Reach
                                       RS: 168.85
TNPIIT
Description: Extended block obstruction, Bathymetric elevations translated from
                   IBWC 2008 Cross-sections
Station Elevation Data
                                      num=
      Sta Elev
0 127.06
75.4 110.67
                                Sta
                                           Elev
                                                         Sta
                            19.67
88.52
                                       126.76
108.73
                                                      29.51
98.35
                                                               124 45.9 118.38
107.74 114.74 107.61
                                                                                                       59.01 114.77
121.3 107.11
  134.41 107.28
199.98 107.46
265.55 107.4
324.56 107.3
                                                               107.45 173.75
107.46 239.32
107.25 311.44
                           140.97
213.09
                                       107.76
107.82
                                                                                        107.82 186.87
108.13 255.71
                                                      167.2
                                                                                                                  107 83
                                                    219.65
                           281.94
370.45
436.02
                                        107.66
                                                                            311.44
403.24
                                                    288.49
                                                                                           107.3
                                                                                                          318
                                       107.55
                                                                107.37
                                                                                                      413.07
                                                     383.57
   422.91
               107.13
                                                    449.13
                                                                             465.53
                                                                                                      472.08
                                       106.76
105.69
107.47
107.42
107.37
107.28
   481.92
567.15
               106.62
106.39
                           501.59
586.82
                                                    514.7
596.66
                                                                106.79
                                                                             534.37
606.49
                                                                                         106.06
                                                                                                     557.32
                                                                                                      685.18
                           652.39
714.68
                                                    665.51
727.79
                                                                106.97
                                                                             678.62
737.63
                                                                                         107.46
   645.84
               108.12
               107.51
                                                                                         106.99
   695.01
   763.86
               107.07
                            770.41
                                                    780.25
                                                                 106.84
                                                                             796.64
868.76
967.12
                                                                                         107.47
107.65
107.1
                                                                                                      819.59
               107.07 770.41
107.84 842.54
107.16 927.77
107.98 1003.18
107.64 1062.19
                                       107.28 780.25
107.31 862.21
107.43 937.61
107.56 1009.73
107.93 1078.58
   826.15
898.27
                                                                107.26
  993.34
1052.35
                                                                 108.01 1032.68
107.94 1085.14
                                                                                         108.19 1045.8
107.59 1094.97
               108.86 1114.64
109 1176.93
                                        108.9 1127.75
109.14 1196.6
 1104.81
                                                                 107.96 1144.15
                                                                                         108.95 1150.7
                                       108.9 1127.75
109.14 1196.6
108.42 1255.61
109.82 1337.57
               108.99 1249.05
                                                                108.48 1278.56
110.71 1347.4
109.1 1416.25
 1239 22
                                                                                         110.27 1294.95
110.07 1357.24
                                                                                                                  110 43
               109.68 1317.9
109.72 1386.74
```

110.01 1426.08

108.3 1485.09 108.88 1557.22

108.49 1616.23 108.37 1626.06 107.44 1685.07 107.42 1708.02

108.56 1403.14

108.97 1458.87 108.91 1508.04

109.29 1606.39

108.17 1475.26 108.52 1534.27

1380.19 1439.2

1491.65 1586.72 108.58 1445.75 108.52 1501.49

109.26 1596.56 108.76 1655.57

108.55

```
109.1 1773.59
109.1 1845.71
110.74 1921.11
                  107.87 1812.93
111.53 1885.05
 1803.09
1875.22
                                               108.79 1826.04
                                                                                                        110.43 1855.55
110.47 1940.78
                                                                                                                                      109.86
111.71
                                               110.27 1908
111.56 1976.84
                                                                             110.7 1986.68
                                                                                                        110.97 1999.79
   1953.9
                  110.88 1967.01
                                                                                                                                      109.13
                                              106.35 2042.41
102.6 2117.81
103.4 2180.11
104.79 2255.51
                                                                           106.08 2068.64
102.42 2134.21
                                                                                                        108.41 2075.2
102.52 2147.32
  2026.02
                  105.97 2035.85
  2088.31
                  103.92 2104.7
                  102.81 2176.83
104.72 2235.84
                                                                            103.17 2189.94
106.5 2265.34
                                                                                                        103.92 2206.33 104.13
108.09 2285.01 109.69
  2212.89
  2291.57
                  109.52 2304.69
                                               110.59 2330.91
111.44 2409.59
                                                                           111.33 2337.47
111.38 2419.43
                                                                                                         111.07 2350.58
                  110.9 2393.2
110.95 2468.61
                                              111.44 2409.59
111.87 2471.88
111.62 2573.52
111.68 2652.2
111.09 2747.27
111.34 2819.4
                                                                            112.47 2491.56 111.24 2501.39
110.51 2603.02 110.82 2612.86
110.76 2675.15 110.78 2691.54
  2455.49
                  110.88 2547.29
111.94 2642.36
  2632.53
                                                                           110.91 2753.83
111.32 2848.9
                                                                                                        111.2 2783.33
112.32 2871.85
  2711.21
                  110.95 2734.16
  2793.17
                  111.76 2799.73
  2888.24
                  111.52 2901.36
112.08 3006.27
                                              111.29 2924.31
110.06 3019.38
                                                                           111.56 2947.26
109.21 3025.94
                                                                                                        111.27 2963.65
109.38 3045.61
    2986.6
                                              109.46 3078.39
109.24 3166.91
108.43 3235.76
                                                                           111.43 3111.18
109.75 3186.58
109.82 3242.31
                                                                                                        110.35 3124.29
108.66 3193.14
109.79 3261.98
                  109.59 3062
108.64 3160.35
  3055.44
                                   3062
  3137.4
3202.97
                                                                                                                                       110.6
                  108.23 3222.64
110.95 3301.33
112.8 3370.17
                                               112.94 3317.72
113.78 3376.73
                                                                           112.69 3324.27
113.73 3386.56
                                                                                                        113.31 3343.94
112.74 3402.96
  3284.93
  3363.62
                  112.94 3432.46
106.85 3537.37
104.07 3632.45
  3422.63
3524.26
                                               112.35 3468.52
106.03 3553.76
                                                                           109.06 3484.92
106.03 3563.6
                                                                                                        105.74 3501.31
105.66 3586.55
                                                                           106.03 3563.6
106.17 3652.12
110.31 3720.96
111.4 3757.03
                                              104.43 3645.56
108.96 3714.41
109.42 3750.47
108.53 3806.2
108.94 3875.05
                                                                                                        106.56 3665.23
111.07 3727.52
  3616.05
                                                                                                                                      108.33
                                                                                                        111.76 3773.42
107.97 3838.99
108.22 3907.83
  3734.08
                  109.55 3743.91
                                                                                                                                        110.6
                                                                           107.35 3832.43
108.53 3891.44
109.77 3950.45
  3779.97
                  109.06 3793.09
107.97 3868.49
  3861.94
                  109.09 3934.06
109.15 3989.79
                                              109.71 3943.9
108.42 4006.19
  3920 95
                                                                                                         109.36 3970.12
  3983.24
                                                                                          4019.3
                                                                                                         108.03 4035.69
                                                                           108.52
                                                                             93.5 4081.59
77.64 4135.15
                  105.61 4065.2
81.02 4115.15
                                                95.85 4075.03
79.64 4125.15
                                                                                                          89.08 4088.15
76.64 4145.15
  4038.97
                    74.64 4165.15
                                                 73.04 4175.15
                                                                              72.64 4185.15
  4155.15
                                                                                                           71.64 4195.15
                                                                                                        71.64 4195.15
73.04 4255.15
76.04 4345.15
88.09 4458.64
102.84 4504.54
112.22 4537.33
                   72.64 4225.15
74.64 4275.15
79.64 4365.15
91.87 4478.31
                                                73.64 4235.15
75.04 4285.15
81.02 4373.15
97.88 4484.87
                                                                              73.64 4245.15
76.04 4325.15
  4205.15
  4265.15
                                                                             83.44 4455.36
99.8 4501.26
  4355 15
  4465.19
                  108.85 4517.65
                                                                            109.96 4534.05
  4514.38
                                               109.76 4527.49
                                                                           109.96 4534.05
110.61 4573.39
110.46 4625.85
110.3 4763.56
109.1 4871.77
111.49 4943.9
                                              111.43 4566.84
110.91 4606.18
110.1 4727.5
109.5 4835.7
                  112.67 4557
110.49 4599.62
110.14 4711.1
109.78 4802.91
                                                                                                        110.14 4632.41
110.01 4779.96
109.9 4891.44
  4589.79
                                                                                                                                      110.27
  4658.64
4793.07
                                                                                                                                      111.27
                 111.69 4920.95
111.86 5006.2
112.06 5127.51
111.73 5212.76
                                                                           111.49 4943.9
111.78 5068.49
111.21 5157.02
111.25 5242.27
                                              112.77 4934.06
111.61 5029.15
                                                                                                        111.18 4973.41
111.44 5088.17
  4907.83
    4989.8
                                              111.46 5143.91
110.91 5229.16
                                                                                                        111.38 5179.97
110.77 5284.9
  5111.12
                                              110.91 5229.16
110.27 5360.31
109.32 5422.61
101.61 5488.18
123 5543.92
132.19 5599.64
132.17 5655.64
114.61 5681.63
100.1 5724.26
                                                                           110.21 5370.14
108.6 5435.72
101.72 5494.74
125.24 5566.87
133.19 5622.61
                                                                                                        109.61 5396.38
108.38 5445.56
103.58 5507.85
                 110.57 5317.68
109.9 5416.05
103.03 5484.9
  5298.01
  5465.23
                                                                                                                                        110.8
                  119.9 5527.53
129.14 5593.1
                                                                                                         125.5 5576.71
132.6 5632.45
                                                                                                                                       126.7
134.7
  5520.97
  5586.55
                  134.15 5639.01
117.77 5678.35
106.89 5714.42
                                                                           119.68 5658.68
114.06 5694.75
92.7 5730.81
  5635 73
                                                                                                         118.86 5668.52
                                                                                                                                      118 45
                                                                                                        114.13 5698.03
  5707.86
                                                                                                           91.6 5888.2
                                                                                                                                         91.6
                                               99.75 5907.87
114.93 5943.94
                                                                            102.5 5917.71
115.66 5960.33
                                                                                                        112.59 5920.98
127.02 5966.89
                    93.03 5904.59
  5894.75
  5924.26
                  115.47 5934.1
                                                                                                                                      131.28
  5973.45
                  134.51 5976.72
144.68 6025.91
                                               135.28 5989.84
145.01 6035.74
                                                                            136.28 5999.68
142.97 6042.3
                                                                                                        137.9 6012.79
142.42 6048.86
  6019.35
                  142.35 6065.25
124.36 6111.16
                                                                            127.11 6075.09
116.55 6120.99
                                                                                                        126.06 6088.2
114.81 6134.11
                                                                                                                                      124 84
  6052 14
                                               131.43 6071.81
                                               121.63 6117.71
  6143.94 110.41 6150.5
6180.01 119.47 6186.57
6232.47 123.73 6252.14
                                               111.27 6157.06
                                                                            112.93
                                                                                         6166.9
                                                                                                         113.73 6173.45
                                                                                                        124.09 6219.36
123.62 6275.1
                                               123.33 6189.85
                                                                            123.88 6202.96
                                                                            125.16 6265.26
                                              125.12 6258.7
                                                                                                                                      119.85
       31.65 121.1 6291.49
6321 119.63 6330.84
                                              120.89 6298.05
120.75 6337.39
                                                                           119.45 6307.88
122.85 6340.67
                                                                                                        121.04 6314.44
123.15 6350.51
  6281.65
   6366.9
                   121.9 6380.02 122.12 6389.85
                                                                           122.66 6402.97
                                                                                                         122 74 6409 53
Manning's n Values
                                              num=
                                                                   6
       Sta n Val Sta n Val Sta n Val Sta 0 .2 3943.9 .2 4065.2 .066 4105.15
                                                                                                         n Val Sta
.015 4373.15
                                                                                                                                         .066
                  .116
  4517.65

        Bank Sta: Left
        Right
        Lengths: Left Channel
        Right

        3943.9
        4534.05
        1531.01
        1524.99
        1539.3

        Left Levee
        Station=
        0
        Elevation=
        127.06

        Right Levee
        Station=
        5632.45
        Elevation=
        134.7

                                                                                                            Coeff Contr.
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | O | 3757.03 | 111.76 | 4550.44 | 6409.53 | 112.67
                                                                2
CROSS SECTION OUTPUT Profile #Design Flow
                                                                    Element
                                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   Vel Head (ft)
                                                     0.23
                                                                                                                     0.200
                                                                                                                                         0.087
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                1531.01
34902.41
                                                120.64
                                                                                                                                      1524.99
                                                                                                                                                          1539.30
                                                    94.09
                                                                                                                                    19416.58
                                                                                                                                                          7827.12
                                       0.000711
130000.0
   E.G. Slope (ft/ft)
Q Total (cfs)
                                                                    Area (sq ft)
Flow (cfs)
                                                                                                                34902.41
                                                                                                                                    19416.58
                                                                                                                                                          7827.12
                                             130000.00
                                                                                                                                      89624.71
                                                                   Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
   Top Width (ft)
Vel Total (ft/s)
                                                5483.22
                                                                                                                  3904.58
                                                                                                                                       590.15
                                                                                                                                                           988 48
                                                                                                                   0.85
                                                                                                                                           4.62
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                    49.00
                                                                                                                        8.94
                                                                                                                                          32.90
                                                                                                                                                                7.92
                                                                                                                                                             397655.8
                                               4875220.0
                                                                                                                  1116486.0
                                                                                                                                      3361078.0
                                               1528.38
                                                                                                                                                           990.95
                                                                                                                  3906.67
                                                                                                                                      601.78
   Min Ch El (ft)
                                                    71.64
                                                                    Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                       0.40
                                                                                                                                       1.43
                                                                                                                                                               0.35
   Alpha
   Frctn Loss (ft)
C & E Loss (ft)
                                                                    Cum Volume (acre-ft)
                                                     0.76
                                                                                                               184601.20
                                                                                                                                      67919.34
                                                                                                                                                         213181.00
                                                                                                                                      2802.23
                                                                    Cum SA (acres)
                Manning's n values were composited to a single value in the main channel.
Note:
                Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
```

Description: Bathymetric elevations translated from IBWC 2008 Cross-sections Station Elevation Data num= 460

RS: 168.58

RIVER: Rio Grande REACH: Lower Reach

| Sta | Elev | Sta | Elev | | Elev | | Elev | | Elev | |
|---|------------------|---|------------------|------------------------|------------------|--------------------|------------------|--------------------|-----------------------------|----------|
| 0
68.88 | 104.61
125.02 | 72.16 | 106.49
125.77 | 88.56 | | 124.64 | 113.58 | 131.2 | 116.17
112.71 | |
| 141.04
213.2 | 112.91 | 147.6
223.04 | | 177.12
246 | 112.7
113.67 | 183.68
259.12 | | | 113.23
114.17 | |
| 282.08 | 114.16 | | 113.32 | 321.44 | 113.56 | 341.12 | 114.58 | | 113.75 | |
| 396.87
475.59 | 114.28
113.6 | | 114.8
113.6 | 501.83 | 114.17
112.38 | 524.79 | 111.56 | 551.03 | 114.04
111.43 | |
| 573.99
655.99 | 110.36 | 583.83
669.11 | | 603.51
682.23 | | | 110.97 | 639.59
728.15 | 107.34
104.2 | |
| 741.27 | 103.91 | 767.51 | 103.9 | 806.87 | 104.37 | 826.55 | 104.19 | 846.23 | 104.74 | |
| 862.63
964.31 | 104.39 | 879.03
987.27 | | 915.11
1006.95 | | | | 938.07
1036.47 | 105.61
104.02 | |
| 1052.87 | 103.73 | 1069.27 | 104.85 | 1088.95 | 104.06 | 1095.51 | 104.83 | 1105.35 | 104.41 | |
| 1125.03
1180.79 | 104.56 | 1131.59
1190.63 | 104.24 | 1203.75 | 104.54 | 1229.98 | 104.03 | 1243.1 | 104.81
103.53 | |
| | | 1275.9
1374.3 | | | | | | | | |
| 1420.22 | 103.71 | 1430.06 | 103.78 | 1436.62 | 104.46 | 1453.02 | 103.9 | 1459.58 | 104.13 | |
| | 103.79 | 1495.66
1580.94 | 104.66 | 1603.9 | 104.28 | 1617.02 | 104.33 | 1630.14 | 103.26
105.01 | |
| 1656.38 | | 1676.06
1774.46 | | | | | | 1758.06
1840.05 | 104.2
103.64 | |
| 1853.17 | 103.81 | 1863.01 | 103.41 | 1902.37 | 103.48 | 1918.77 | 104.05 | 1931.89 | 103.44 | |
| 1958.13
2013.89 | | 1964.69
2036.85 | | | | | | | 103.64
103.65 | |
| 2125.41 | 104.16 | 2131.97 | 103.99 | 2145.09 | 104.65 | 2161.49 | 105.87 | 2171.33 | 105.92 | |
| 2184.45
2253.33 | 104.23 | 2207.41
2286.13 | 104.42 | 2302.52 | 104.75 | 2322.2 | 104.74 | 2351.72 | 105.11
105 | |
| 2377.96
2486.2 | 104.64 | 2394.36
2492.76 | 104.62 | 2410.76 | 104.97 | 2427.16 | 105.72 | 2469.8 | 105.75 | |
| 2571.48 | 107.31 | 2591.16 | 107.56 | 2607.56 | 107.15 | 2627.24 | 107.96 | 2640.36 | 110.61 | |
| 2660.04
2774.83 | | 2676.44
2787.95 | | | | | | | 107
108.46 | |
| 2856.83 | 108.92 | 2869.95 | 108.53 | 2892.91 | 108.65 | 2912.59 | 109.33 | 2922.43 | 109.33 | |
| 2942.11
3020.83 | 101.74 | 2971.63
3037.23 | 110.78 | 3047.07 | 106.98 | 3056.91 | 104.75 | 3007.71 | 102.65
101.49 | |
| 3106.1
3165.14 | 102.47 | 3037.23 | 104.19 | 3129.06 | 106.8 | 3138.9 | 109.91 | 3152.02 | 110.46 | |
| 3240.58 | | 3174.98
3260.26 | | | | 3276.66 | | | 110.22
110.62 | |
| 3319.3
3407.86 | 110.34
110.53 | 3332.42
3417.7 | | | 110.1 | 3368.5
3447.22 | | 3388.18 | 110.52
110.36 | |
| 3470.17 | 111.45 | 3512.81 | 111.25 | 3539.05 | 111.39 | 3548.89 | 111.09 | 3594.81 | 111.52 | |
| 3601.37
3666.97 | 111.11 | 3607.93
3689.93 | 109.76 | 3624.33
3709.61 | 108.29 | 3637.45
3735.85 | 105.55 | 3647.29
3781.77 | 104.67
105.85 | |
| 3798.17 | 106.01 | 3808.01 | 106.9 | 3827.69 | 106.85 | 3840.8 | 107.56 | 3850.64 | 107.45 | |
| 3867.04
4008.08 | 107.31 | 3883.44
4031.04 | 108.13 | 4044.16 | 107.75 | 4057.28 | 108.92 | 4093.36 | 107.72 | |
| 4113.04
4162.24 | 110 2 | 4122.88
4178.64 | 100 55 | 4195 2 | 100 05 | 1211 11 | 100 24 | 1221 28 | 109.82
109.87 | |
| 4240.96 | 109.16 | 4254.08
4359.04 | 110.05 | 4273.76 | 110.84 | 4290.16 | 111.85 | 4313.12 | 112.22 | |
| 4332.8
4434.49 | 111.9 | 4359.04 | 112.22 | 4385.28 | 111 | 4411.53 | 111.58 | 4424.65 | 113.19
108.07 | |
| 4513.21 | 109.9 | 4532.89 | 110.4 | 4546.01 | 111.92 | 4555.85 | 112.1 | 4562.41 | 111.69 | |
| 4572.25
4624.73 | 114.26 | 4575.53
4657.53 | 107.88 | 4664.09 | 107.45 | | 108.96 | 4703.45 | 114.3
108.77 | |
| 4710.01
4775.61 | | 4723.13
4795.29 | | | | 4749.37
4824.81 | | | 102.86
99.24 | |
| 4841.22 | 94.55 | 4851.06 | 92.18 | 4857.62 | 88.74 | 4864.18 | 87.93 | 4828.09
4884.18 | 79.96 | |
| 4924.18
5049.18 | | | | 4980.18
5077.18 | | 5015.18
5094.18 | | 5032.18
5104.18 | 70.46
80.03 | |
| 5124.18 | 79.96 | 5133.1 | | 5139.65 | 88.57 | 5152.77
5185.56 | 95.85 | 5156.05
5195.4 | 97.12
98.83 | |
| 5162.61
5201.96 | 101.82 | 5208.52 | | 5218.35 | 108.66 | 5234.75 | 108.78 | 5247.86 | 109.55 | |
| 5267.54
5339.68 | 108.14 | 5274.1
5352.8 | 108.65 | 5290.49 | 107.69 | 5303.61 | 108 | 5323.28 | 107.87
104.94 | |
| 5408.54 | 105.92 | 5418.38 | 108.23 | 5428.21 | 112.04 | 5457.73 | 112.58 | 5477.4 | 110.83 | |
| | | 5500.35
5585.61 | | | | | | | 110.3
109.87 | |
| 5654.47 | 110.44 | 5657.75
5733.17 | 110.14 | 5680.7 | 105.8 | 5683.98 | 105.48 | 5706.94 | 105.17 | |
| 5824 98 | 107 4 | 5847 94 | 107 06 | 5861 05 | 107 38 | 5884 01 | 111 46 | 5890 57 | 112 23 | |
| 5897.12
5972 54 | 111.73 | 5913.52
5979.1
6087.31 | 111.66 | 5933.19 | 113.24 | 5949.59
6057 8 | 113.51 | 5965.99
6064 36 | 115.05 | |
| 6077.47 | 113.54 | 6087.31 | 113.79 | 6100.43 | 113.03 | 6113.54 | 113.85 | 6129.94 | 112.71 | |
| | | 6143.06
6221.75 | | | | | | | | |
| 6333.24 | 111.54 | 6359.48 | 112.14 | 6375.87 | 111.73 | 6405.38 | 111.89 | 6418.5 | 112.29 | |
| 6516.87 | 122.17 | 6467.69
6536.55
6602.13 | 122.92 | 6552.94 | 124.11 | 6575.9 | 123.99 | 6585.73 | 126.15 | |
| 6592.29
6628.36 | 126.34 | 6602.13
6641.48 | 124.92
112.18 | 6605.41
6648.04 | 123.55
109.71 | 6611.97 | 117.13
102.91 | 6618.52
6667.71 | 112.97
100.32 | |
| 6680.83 | 98.84 | 6690.66
6897.25 | 95.15 | 6693.94 | 92.69 | 6700.5 | 91.6 | 6880.85 | 91.6 | |
| 6920 2 | 115 89 | 6930 04 | 122 81 | 6936 6 | 124 38 | 6939 88 | 123 46 | 6946 43 | 123 64 | |
| 6952.99
6995.62 | 126.78 | 6962.83
7008.74
7077.6
7149.74 | 126.65 | 6979.22
7018 57 | 123.17 | 6985.78 | 123.09 | 6992.34
7041 53 | 125.18 | |
| 7054.64 | 111.76 | 7077.6 | 111.23 | 7084.15 | 110.4 | 7097.27 | 110.17 | 7116.95 | 110.49 | |
| 7123.5
7202.2 | 111.1 | 7149.74 7218.6 | 109.95 | 7162.85 | 109.97 | 7169.41 | 110.42 | 7182.53 | 110.25
109.36 | |
| 7264.5 | 108.89 | 7274.34 | 109.19 | 7287.46 | 108.79 | 7310.41 | 108.71 | 7320.25 | 109.99 | |
| 7326.81 | 111.87 | 7343.2
7395.67 | 114.77 | 7408.78 | 114.21 | 7418.62 | 110.24 | 7431.74 | 113.95 | |
| Manning's | n Value | es | num= | 4 | | | | | | |
| Manning's
Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | | | |
| | | 72.16 | | | | | | | _ | |
| Bank Sta:
47
Ineffecti
Sta L
0
5218.35 | Left
03.45 52 | Right
218.35 | Length | s: Left C
1510.38 1 | nannel
525.35 | Right
1543.94 | Coefi | Contr. | Expan. | |
| Ineffecti | ve Flow | num= | Dorm | 2 | | · · · · · · | | | | |
| oca L | 5ta R
4703.45 | 108.77 | rermane
T | 2116 | | | | | | |
| 5218.35
Left Leve | 7431.74
e ' | 108.66
Station= | T
72.16 | El- | vation= | 125.77 | | | | |
| Left Leve
Right Lev | ee S | Station= | 6592.29 | Ele | vation= | 126.34 | | | | |
| CROSS SEC | TION OUT | TPUT Pro | file #De | esign Flo | W | | | | | |
| E.G. El | ev (ft) | | 120.0 | 08 Ele | ment | | 1 | Left OB | Channel | Right OB |
| Vel Hea | d (ft) | | 119 | 11 Wt. | n-Val. | (ft) | 1 (| 0.120 | Channel
0.076
1525.35 | 0.085 |
| | / | | | | | , | | | | |

| Crit W.S. (ft) | 96.46 | Flow Area (sq ft) | 47029.73 | 16649.70 11385.05 |
|--------------------|-----------|------------------------|-----------|--------------------|
| E.G. Slope (ft/ft) | 0.000365 | Area (sq ft) | 57714.56 | 16649.70 12069.80 |
| Q Total (cfs) | 130000.00 | Flow (cfs) | 52332.48 | 61296.49 16371.03 |
| Top Width (ft) | 6382.42 | Top Width (ft) | 4597.74 | 514.90 1269.77 |
| Vel Total (ft/s) | 1.73 | Avg. Vel. (ft/s) | 1.11 | 3.68 1.44 |
| Max Chl Dpth (ft) | 50.11 | Hydr. Depth (ft) | 10.23 | 32.34 8.97 |
| Conv. Total (cfs) | 6807426.0 | Conv. (cfs) | 2740381.0 | 3209779.0 857265.7 |
| Length Wtd. (ft) | 1522.90 | Wetted Per. (ft) | 4607.19 | 533.56 1273.59 |
| Min Ch El (ft) | 69.86 | Shear (lb/sq ft) | 0.23 | 0.71 0.20 |
| Alpha | 2.38 | Stream Power (lb/ft s) | 0.26 | 2.62 0.29 |
| Frctn Loss (ft) | 0.92 | Cum Volume (acre-ft) | 182973.60 | 67288.02 212829.50 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 22603.19 | 2782.89 25297.38 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 168.3

Description: Extended block obstruction, Bathymetric elevations translated from IBWC 2008 Cross-sections

| _ | | 2008 Cr | | | - | | | | |
|--------------------|-------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|---------------|
| Station I | Elevation
Elev | | num=
Elev | 460
Sta | Elev | Sta | Flou | C+ a | Elev |
| 0 | 101 | Sta
9.84 | 101.04 | 36.07 | 100.56 | 52.47 | Elev
102.76 | Sta
68.87 | 107.15 |
| 91.83 | 113.83 | 98.38 | 116.48 | 124.62 | 124.51 | 134.46 | 125.28 | 144.3 | 124.83 |
| 167.25 | 117.43 | 180.37 | 112.81 | 186.93 | 112.17 | 203.33 | 111.53 | 213.17 | 111.95 |
| 229.56 | 111.56 | 252.52 | 112.06 | 275.48 | 111.49 | | 111.92 | 327.95 | 111.72 |
| 350.91
446.01 | 111.86
111.27 | 357.46
482.09 | 112.28
111.76 | 393.54
491.92 | 111.82
111.19 | 406.66
498.48 | 112.04
111.7 | 432.89
508.32 | 111.7 |
| 518.16 | 111.15 | 528 | 110.34 | 544.4 | 110.3 | 564.07 | 110.85 | 580.47 | 110.65 |
| 590.31 | 110.92 | 603.43 | 110.8 | 613.26 | 111.22 | 636.22 | 111.22 | 649.34 | 111.78 |
| 672.3 | 111.23 | 688.69 | 111.39 | 695.25 | 111.01 | 714.93 | 111.07 | 734.61 | 111.68 |
| 741.17 | 111.3 | 783.8 | 111.75 | 790.36 | 111.43 | 800.2 | 111.94 | 806.76 | 111.6 |
| 823.15
937.94 | 111.94
111.98 | 832.99
947.77 | 111.35
112.87 | 862.51
964.17 | 111.97
112.24 | 888.74
977.29 | 112.03
112.74 | 898.58
1006.8 | 112.46 |
| 1026.48 | 112.77 | | | 1049.44 | 113 | 1056 | | 1075.67 | 112.44 |
| 1088.79 | 112.89 | | 112.31 | 1141.27 | | 1180.62 | | 1193.74 | 112.6 |
| 1219.97 | 112.95 | | | 1256.05 | | 1275.73 | | 1318.36 | 113.82 |
| 1328.2 | 113.52 | | | 1397.07 | | 1413.47 | | 1420.02 | 114.33 |
| 1456.1
1528.25 | 114.08
114.84 | | | 1485.62
1587.28 | | 1492.17
1593.84 | | 1498.73
1633.19 | 114.27 |
| 1646.31 | 113.76 | | | 1718.46 | 110.04 | 1744.7 | | 1757.82 | 105.89 |
| 1774.21 | 105.86 | | | 1816.85 | | 1843.08 | | 1852.92 | 104.62 |
| 1866.04 | 103.74 | | | 1902.12 | | 1925.07 | | 1957.87 | 103.64 |
| 2003.78 | 103.37 | | | 2066.09 | | 2085.77 | | 2112.01 | 103.96 |
| 2125.12
2216.95 | 104.33
104.26 | | | 2151.36
2246.47 | 103.7 | 2177.6
2259.58 | 104.19 | 2193.99
2272.7 | 103.92 |
| 2289.1 | | 2305.5 | 104.7 | 2321.9 | | 2338.29 | | 2348.13 | 104.61 |
| 2361.25 | 105.06 | | | 2390.77 | | 2397.32 | | 2407.16 | 104.1 |
| 2417 | 105.44 | | | 2456.36 | | 2469.47 | | 2476.03 | 103.72 |
| 2495.71 | 104.15 | | | 2541.62 | | 2564.58 | | 2571.14 | 104.47 |
| 2600.66
2705.6 | 103.39
103.37 | | 103.51 | 2649.85
2738.4 | | 2662.97
2787.59 | | 2685.92
2803.99 | 103.2 |
| 2820.38 | 106.89 | 2833.5 | 107.26 | 2849.9 | | 2863.02 | | 2869.58 | 107.1 |
| 2885.97 | 107.93 | | | 2931.89 | 109.54 | 2941.73 | | 2958.12 | 107.16 |
| 2977.8 | 107.39 | | | 3013.88 | | 3023.71 | | 3036.83 | 108.64 |
| 3043.39
3138.5 | 108.24
108.71 | | | 3082.75
3184.41 | | 3095.86
3220.49 | 109.33 | 3122.1
3233.6 | 108.61 |
| 3246.72 | 100.71 | | | 3289.36 | | 3295.91 | | 3315.59 | 109.74 |
| 3325.43 | 110.39 | | | 3358.23 | 109.74 | 3368.06 | | 3384.46 | 110.98 |
| 3391.02 | 110.37 | 3410.7 | 111.86 | 3427.1 | | 3446.77 | | 3456.61 | 110.42 |
| 3473.01 | 105.54 | | | 3502.53 | | 3545.16 | | 3577.95 | 103.84 |
| 3587.79
3715.69 | 103.64
105.31 | | | 3653.38
3745.21 | | 3659.94
3774.73 | | 3679.62
3787.84 | 105.21 |
| 3804.24 | 104.25 | | | 3853.43 | | 3866.55 | | 3896.07 | 104.37 |
| 3912.47 | 104.73 | 3922.3 | 104.59 | 3938.7 | 105.05 | 3971.5 | | 4001.01 | 105.92 |
| 4017.41 | | 4033.81 | | 4060.04 | | 4073.16 | | 4089.56 | 103.1 |
| 4105.96 | 103.76 | | | 4148.59 | | 4171.55 | | 4187.94 | 107 |
| 4201.06
4306 | 107.36
106.66 | | | 4263.37
4355.19 | | 4266.65
4374.87 | | 4292.88
4381.43 | 107.14 |
| 4404.38 | 106.32 | | 106.97 | 4433.9 | | 4447.02 | | 4460.13 | 106.18 |
| 4466.69 | 106.58 | | | 4506.05 | | 4522.44 | | 4548.68 | 106.29 |
| 4561.8 | 106.46 | | | 4604.43 | | 4637.22 | | 4647.06 | 109.14 |
| 4670.02
4742.17 | 108.62 | 4679.86
4765.12 | 111.85 | 4702.81
4784.8 | | 4722.49
4794.64 | | 4732.33
4814.31 | 111.46 |
| 4827.43 | 111.07 | | | 4856.94 | | 4886.46 | | 4902.85 | 108.59 |
| 4919.25 | 105.82 | | | 4955.33 | | 4965.16 | | 4971.72 | 110.95 |
| 4984.84 | 109.58 | | | 5004.52 | | 5014.36 | | 5020.91 | 101.09 |
| 5027.47 | 101.12 | | | 5050.43 | | 5060.27 | | 5066.83 | 104.47 |
| 5073.39
5122.58 | 101.49
87.79 | 5124.58 | 86.12 | 5089.78
5171.58 | | 5109.46
5191.58 | | 5116.02
5211.58 | 88.6
80.52 |
| 5241.58 | | 5251.58 | | 5271.58 | | 5291.58 | | 5301.58 | 80.02 |
| 5321.58 | | 5331.58 | | 5351.58 | | 5381.58 | | 5401.58 | 79.32 |
| 5411.58 | | 5414.43 | | 5420.99 | 88.61 | 5434.1 | | 5443.94 | 96.34 |
| 5450.5
5558.7 | 102.81 | 5463.61
5575.1 | | 5483.29
5584.94 | 103.12 | 5496.4
5598.05 | | 5522.64
5607.89 | 102.82 |
| 5627.56 | | 5670.19 | | 5693.14 | | 5706.26 | | 5712.82 | 110.3 |
| 5716.1 | 110.81 | | 111.03 | 5755.44 | | 5771.84 | | 5834.14 | 109.95 |
| 5850.53 | 109.43 | | | 5883.32 | | 5909.55 | | 5919.39 | 109.63 |
| 5952.18 | | | | 5984.97 | | | | 6014.48 | 109.23 |
| 6024.32
6155.48 | 109.69
110.02 | | 109.51 | 6073.5
6207.94 | | 6106.29
6230.89 | | 6145.64
6244.01 | 109.51 |
| 6263.68 | | 6273.52 | | 6286.63 | | 6319.42 | | 6329.26 | 109.04 |
| 6352.21 | 108.48 | | 107.98 | 6450.58 | | 6460.42 | | 6483.37 | 108.48 |
| 6493.21 | | 6503.05 | 108.99 | 6519.44 | | 6529.28 | 108.41 | 6548.95 | 108.38 |
| 6565.35 | 108.79 | | | 6591.58 | | 6598.13 | | 6611.25 | 108.7 |
| 6637.48
6703.06 | 108.61
108.48 | | | 6653.88
6722.73 | | 6673.55
6732.57 | | 6689.94
6748.97 | 108.5 |
| 6765.36 | 100.40 | 6775.2 | 109.07 | 6821.1 | | 6840.78 | | 6847.33 | 109.13 |
| 6863.73 | 108.48 | 6880.12 | 108.52 | 6903.08 | 109.39 | 6916.19 | 114.12 | 6922.75 | 117.42 |
| 6939.14 | 127.27 | 6942.42 | | 6965.38 | | 6978.49 | | 6988.33 | 125.6 |
| 7001.44
7040.79 | 126.45
128.08 | | | 7017.84
7057.19 | 128.57 | 7030.96
7067.02 | | 7037.51
7083.42 | 129.38 |
| 7040.79 | | 7103.09 | | 7106.37 | | 7112.93 | | 7119.49 | 92.79 |
| 7126.05 | | 7293.27 | | 7299.83 | | 7309.67 | 103.46 | | 111.82 |
| | | | | | | | | | |
| | | | | | | | | | |

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7326.06 113.48 7335.9 112.92 7342.46 113.67 7349.01 115.95 7358.85 7368.69 125.53 7378.52 127.56 7381.8 127.36 7388.36 124.46 7398.2 7421.15 126.41 7440.83 130.29 7457.22 127.63 7467.06 124.78 7473.61 7480.17 120.57 7493.29 115.27 7512.96 113.37 7526.08 110.2 7542.47 7549.03 111.16 7571.98 112.41 7598.21 112.65 7621.17 112.14 7640.84 7653.96 111.69 7696.58 111.61 7706.42 111.25 7726.09 111.4 7772 7791.67 111.68 7804.79 111.41 7834.3 111.61 7840.86 111.98 7857.25 7896.6 111.93 7909.72 112.69 7926.11 112.42 7932.67 111.8 7958.9 7972.02 111.69 7981.85 113.07 7988.41 114.65 7998.25 114.49 8004.81 8027.76 111.56 8040.88 112.02 8060.55 111.95 8076.94 111.36 8086.78
                                                                                                                                                                                                                  125.59
121.89
                                                                                                                                                                                                                  110.19
                                                                                                                                                                                                                  111.25
                                                                                                                                                                                                                 111.55
Manning's n Values num=

Sta n Val Sta n Val

0 .2 5089.78 .2 510
                                                                                                        Sta n Val Sta
9.46 .066 5171.58
                                                                                                                                                                     n Val Sta
.015 5411.58
                                                                                                                                                      Sta
                                                                                                                                                                                                                  n Val
                                                                              .2 5109.46
Coeff Contr.
                                                                                                                                                                                                                   Expan.
CROSS SECTION OUTPUT Profile #Design Flow
```

| E.G. Elev (ft) | 119.15 | Element | Left OB | Channel | Right OB | |
|--------------------|-----------|------------------------|-----------|-----------|-----------|--|
| Vel Head (ft) | 0.19 | Wt. n-Val. | 0.200 | 0.103 | 0.116 | |
| W.S. Elev (ft) | 118.97 | Reach Len. (ft) | 1645.88 | 1675.00 | 1663.72 | |
| Crit W.S. (ft) | 99.09 | Flow Area (sq ft) | 35977.37 | 16997.22 | 10980.52 | |
| E.G. Slope (ft/ft) | 0.001177 | Area (sq ft) | 35977.37 | 16997.22 | 10980.52 | |
| Q Total (cfs) | 130000.00 | Flow (cfs) | 35061.07 | 75231.05 | 19707.88 | |
| Top Width (ft) | 6762.83 | Top Width (ft) | 4809.23 | 626.33 | 1327.27 | |
| Vel Total (ft/s) | 2.03 | Avg. Vel. (ft/s) | 0.97 | 4.43 | 1.79 | |
| Max Chl Dpth (ft) | 39.95 | Hydr. Depth (ft) | 7.48 | 27.14 | 8.27 | |
| Conv. Total (cfs) | 3789897.0 | Conv. (cfs) | 1022137.0 | 2193215.0 | 574544.9 | |
| Length Wtd. (ft) | 1661.36 | Wetted Per. (ft) | 4811.25 | 639.54 | 1330.08 | |
| Min Ch El (ft) | 79.02 | Shear (lb/sq ft) | 0.55 | 1.95 | 0.61 | |
| Alpha | 2.92 | Stream Power (lb/ft s) | 0.54 | 8.64 | 1.09 | |
| Frctn Loss (ft) | 1.03 | Cum Volume (acre-ft) | 181349.30 | 66698.91 | 212421.00 | |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 22440.11 | 2762.91 | 25251.35 | |
| | | | | | | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

Note:

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande RS: 168 REACH: Lower Reach

INPUT

| INFUI | | | | | | | | | |
|------------------------|--------|---------|--------|------------------|----------|----------|---------|-----------|--------|
| Descripti
Station E | | | num= | ons trans
460 | lated ii | rom IBWC | 2008 Ci | oss-secti | .ons |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | r Sta | Elev |
| 0 | 119.98 | 13.12 | 124.23 | 29.52 | 124.25 | 32.8 | 123.56 | 49.2 | 117.39 |
| 55.76 | 115.33 | 78.72 | 106.72 | 88.56 | 105.09 | 101.68 | 103.86 | 114.81 | 104.47 |
| 141.05 | 104.51 | 180.41 | 104.01 | 318.18 | 104.67 | 367.38 | 105.24 | 383.78 | 105.7 |
| 403.46 | 105.67 | 442.82 | 105.98 | 452.66 | 105.79 | 488.74 | 106.09 | | 105.96 |
| 528.11 | 106.19 | 600.27 | 106.24 | 619.95 | 106 | 633.07 | 106.59 | | 106.42 |
| 685.55 | 105.71 | 695.39 | 105.63 | 705.23 | 106.55 | 761 | 106.25 | | 106.39 |
| 797.08 | 106.12 | 810.2 | 106.39 | 829.88 | 106.18 | 843 | 106.51 | | 106.21 |
| 888.92 | 106.56 | 931.57 | 106.08 | 957.81 | 106.54 | | | 1007.01 | 106.12 |
| 1059.49 | | 1105.41 | 106.04 | 1157.9 | | 1177.58 | | 1197.26 | 106.26 |
| 1236.62 | | 1275.99 | | 1298.95 | | 1318.63 | | 1331.75 | 107.19 |
| 1341.59 | | 1377.67 | | 1394.07 | | 1403.91 | 109.57 | | 106.1 |
| 1430.16 | | 1449.84 | | 1469.52 | | 1479.36 | | 1492.48 | 105.63 |
| 1515.44 | | 1535.12 | | 1544.96 | | 1584.33 | | 1597.45 | 105.28 |
| 1633.53 | | 1640.09 | | 1659.77 | | 1666.33 | | 1676.17 | 104.4 |
| 1699.13 | | 1705.69 | | 1728.65 | | 1738.5 | | 1774.58 | 104.62 |
| 1781.14 | | 1794.26 | 104.51 | 1820.5 | | 1846.74 | | 1856.58 | 105.09 |
| 1872.98 | | 1892.67 | | 1902.51 | | 1909.07 | | 1932.03 | 104.36 |
| 1948.43 | | 1958.27 | | 1987.79 | | 2014.03 | | 2020.59 | 103.94 |
| 2036.99 | | 2046.84 | | 2059.96 | 104.51 | | | 2122.28 | 103.74 |
| 2158.36 | | 2171.48 | 105.3 | 2184.6 | | 2194.44 | | 2217.4 | 107.69 |
| 2223.96 | | 2243.64 | | 2260.04 | | 2269.88 | | 2296.12 | 106.75 |
| 2305.96 | | 2322.36 | | 2335.48 | | 2345.32 | | 2358.44 | 106.07 |
| 2368.28 | 105.2 | 2381.4 | | 2391.25 | | 2401.09 | | 2420.77 | 107.29 |
| 2427.33 | | 2440.45 | | 2453.57 | | 2499.49 | | 2525.73 | 107.22 |
| 2578.21 | | 2614.29 | | 2633.97 | | 2643.81 | | 2653.65 | 103.83 |
| 2666.77 | | 2686.45 | | 2696.29 | | 2735.65 | | 2755.33 | 103.54 |
| 2778.3 | | 2784.86 | | 2801.26 | | 2817.66 | | 2834.06 | 104.05 |
| 2850.46 | | 2866.86 | | 2879.98 | | 2902.94 | | 2925.9 | 104.05 |
| 2935.74 | | 2955.42 | | 2965.26 | | 2994.78 | | 3001.34 | 104.13 |
| 3017.74 | | 3037.42 | | 3053.82 | | 3076.78 | | 3109.58 | 104.17 |
| 3119.43 | | 3132.55 | | 3152.23 | | 3198.15 | | 3227.67 | 103.5 |
| 3250.63 | | 3270.31 | | 3280.15 | | 3306.39 | | 3316.23 | 103.74 |
| 3345.75 | | 3388.39 | | 3450.71 | | 3470.39 | | 3496.64 | 105.82 |
| 3516.32 | | 3522.88 | | 3549.12 | | 3562.24 | | 3572.08 | 106.94 |
| 3581.92 | | 3591.76 | 107.47 | 3601.6 | 106.46 | 3631.12 | 106.36 | 3640.96 | 106.59 |
| 3650.8 | 106.16 | 3683.6 | 106.48 | 3706.56 | 106.19 | 3732.8 | 106.24 | 3768.88 | 106.72 |
| 3801.68 | 106.73 | 3827.92 | 107.34 | 3850.89 | 106.82 | 3893.53 | 107.45 | 3913.21 | 107.09 |
| 3932.89 | | 3982.09 | 107.53 | 4011.61 | 110.73 | 4024.73 | 110.96 | 4054.25 | 109.09 |
| 4067.37 | 109.58 | 4073.93 | 109.13 | 4093.61 | | 4110.01 | 110.69 | 4116.57 | 110.3 |
| 4146.1 | 109.57 | 4152.66 | 110.18 | 4169.06 | 110.61 | 4178.9 | 112.09 | 4208.42 | 110.64 |
| 4214.98 | 111.28 | 4244.5 | 111.21 | 4274.03 | 109.81 | 4296.99 | 110.84 | 4313.39 | 110.58 |
| 4336.35 | 111.19 | 4342.91 | 112.32 | 4359.31 | 111.15 | 4369.15 | 111.19 | 4388.84 | 109.08 |
| 4405.24 | 107.74 | 4415.08 | 107.58 | 4421.64 | 108.64 | 4444.6 | 109.55 | 4457.72 | 110.43 |
| 4480.68 | 109.58 | 4503.65 | 108.3 | 4520.05 | 108.02 | 4526.61 | 107.16 | 4543.01 | 106.39 |
| 4562.69 | 106.98 | 4569.25 | 106.63 | 4608.61 | 107.8 | 4618.45 | 109.18 | 4638.14 | 108.5 |
| 4647.98 | 108.57 | 4667.66 | 110.09 | 4674.22 | 109.62 | 4684.06 | 110.42 | 4703.74 | 108.9 |
| 4713.58 | 109.61 | 4736.54 | 109.14 | 4762.79 | 106.93 | 4782.47 | 108.93 | 4795.59 | 108.97 |
| 4808.71 | 109.8 | 4818.55 | 109.29 | 4828.39 | 109.4 | 4841.51 | 107.35 | 4851.35 | 107.85 |
| 4861.19 | 107.4 | 4890.72 | 109.2 | 4907.12 | 109.94 | 4916.96 | 108.77 | 4933.36 | 109.07 |
| 4943.2 | 110.64 | 4959.6 | 111.04 | 4979.28 | 109.53 | 4995.68 | 110.59 | 5008.81 | 108.9 |
| 5031.77 | | 5058.01 | | 5067.85 | | 5074.41 | | 5080.97 | 111.6 |
| 5094.09 | 111.88 | 5103.93 | 111.17 | 5117.05 | 111.75 | 5130.18 | 111.2 | 5143.3 | 111.68 |

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5166.26 111.86 5172.82 110.45 5182.66 105.31 5195.78
  5218.74
                 96.26 5235.14
106.32 5297.47
                                              97.06 5251.55
                                                                         99.33 5264.67
107.12 5317.15
                                                                                                     102.62 5271.23
                                                                                                                                103.28
                                                                                                      85.1 5394.67
77.64 5494.67
  5340.11
                   89.12 5346.67
                                              87.56 5366.67
                                                                          85.11 5386.67
                                                                                                                                   76.98
                   76.54 5421.67
77.34 5520.67
                                              77.09 5469.67
77.74 5538.67
                                                                          77.84 5482.67
77.57 5546.67
  5404.67
  5508.67
                                                                                                      85.23 5566.67
                 85.2 5655.02
91.03 5694.38
93.19 5766.53
108.67 5825.56
                                              87.56 5658.3
94.16 5704.22
                                                                          87.59 5664.86
94.28 5727.18
                                                                                                      90.82 5668.14
95.36 5733.74
  5626.67
  5684.54
  5753.41
                                               92.79 5786.21
                                                                         94.35 5792.77
110.56 5841.96
                                                                                                     96.47 5809.16
109.95 5855.07
                                               110.3 5832.12
  5894.42
                 108.8 5937.05
108.48 6094.46
108.09 6219.07
                                             108.28 5982.96
                                                                         108.46 6015.76
                                                                                                     108.09 6045.27
                                                                                                                                 108.46
                                                                        108.46 6015.76
109.32 6150.21
108.55 6255.15
107.8 6379.76
110.83 6468.3
109 6563.4
108.08 6668.34
108.55 6792.95
106.15 6901.17
104.17 7042.18
                                             109.56 6114.14
108.95 6228.91
                                                                                                     108.1 6169.88
108.57 6284.66
  6186.28
                 107.12 6327.29
                                                                                                     109.74 6399.44
109.79 6484.7
  6307.62
                                             107.32 6343.69
  6428.95
                                              110.4 6448.62
                                            110.4 6448.62
108.53 6533.89
108.41 6648.66
108.33 6763.44
107.12 6894.61
105.07 7019.22
104.83 7137.28
112.04 7209.42
                                                                                                   109.79 6484.7
107.95 6583.08
108.44 6691.29
108 6815.91
106.35 6940.52
104.64 7074.97
                111 6438.79
109 6514.21
108.3 6635.54
108.27 6756.88
107.05 6861.82
104.88 6999.55
  6491.26
  6596.19
  6707.69
                                                                                                                                 108.14
  6986.43
                                                                                                    104.64 7074.97 104.56
106.19 7166.79 107.45
114.49 7222.54 119.18
124.67 7258.61 123.6
128.22 7304.52 127.34
113.47 7347.15 112.42
91.6 7550.31 93.4
113.35 7616.06 113.51
130.11 7661.97 130.08
119.54 7720.99 114.48
108.44 7763.62 110.99
                 104.86 7111.04
110.8 7199.58
120.57 7235.66
123.94 7281.57
  7088.09
7193.03
                                                                         106.01 7147.12
112.9 7215.98
                                                                        112.9 7215.98
124.78 7252.05
128.65 7301.24
114.78 7330.76
91.63 7557.03
112.39 7596.38
129.15 7655.41
121.25 7698.04
108.47 7753.79
109.33 7812.81
106.68 7888.24
                                             122.19 7245.49
126.63 7291.4
116.48 7324.2
  7225.82
7265.17
                 123.94 7281.57
122.48 7320.92
109.33 7360.27
99.25 7583.26
119.62 7642.29
128.35 7681.64
                                             116.48 7324.2
105.18 7376.67
  7314.36
                                            106.82 7593.1
126.33 7648.85
123.19 7688.2
112.75 7743.95
109.42 7793.14
  7566.87
  7632.45
7671.8
                 114.41 7734.11
111.04 7780.02
  7727.55
7770.18
                                                                                                     108.44 7763.62
                                                                                                                                 110 99
                                                                                                     108.44 7763.62
110.31 7822.65
106.97 7901.35
107.87 7999.73
                                             107.19 7865.28
106.32 7980.06
                 107.32 7852.17
106.06 7960.38
                                                                         106.68 7888.24
108.44 7989.9
  7835.77
                                                                         106.68 /888.24
108.44 7989.9
106.06 8035.81
105.07 8117.79
106.01 8229.28
                                             106.32 8029.25
                                                                                                     106.56 8045.64
  8006.29
                 105.61 8012.85
  8062.04 104.59 8071.88
8140.74 105.45 8166.98
8265.36 106.09 8275.19
                                             103.23 8111.23
106.26 8176.82
                                                                                                     104.88 8127.63
106.18 8235.84
                                             105.84 8288.31
107.39 8429.32
109.92 8498.19
                                                                        106.54 8311.27
107.48 8449
                                                                                                     108.53 8324.38
 8363.74 107.6 8393.25
8481.79 108.22 8491.63
                                                                                                     107.04 8465.39
                                                                          112.8 8508.02
                                                                                                     115.86 8517.86
                                                                          108.3 8557.21
Manning's n Values num= Sta n Val Sta n Val Sta n Val Sta 29.52 .066 1597.45
                                                                                                      n Val
                                                                         n Val
                                                                             .12 5394.67
                                                                                                         .025 5546.67
                                             Lengths: Left Channel Right 1221.72 1587.5 1609.1
Bank Sta: Left Right 5297.47 5832.12
                                                                                                        Coeff Contr.
                                                                                                                                   Expan.
Station= 13.12
Station= 7291.41
                                                                 Elevation= 124.23
Elevation= 128.65
Left Levee
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
                                    118.08
   E.G. Elev (ft)
                                                                                                               Left OB
                                                                                                                                                    Right OB
                                                                  Element
                                                                                                                                Channel
                                                                 Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
   Vel Head (ft)
                                                                                                                 0.095
                                                    0.06
                                                                                                                                    0.099
                                                                                                                                                        0.120
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                               1587.50
16120.51
                                            118.02
                                                                                                                                                    1609.10
                                                                                                            1221.72
52930.12
   Crit W.S. (ft) 98.92
E.G. Slope (ft/ft) 0.000384
Q Total (cfs) 130000.00
                                                                                                            60949.59
                                                                                                                               16120.51
                                                                                                                                                  13911.42
    Top Width (ft)
                                              7173.39
                                                                                                             5249.95
                                                                                                                                  534.65
                                                                                                                                                    1388.80
   Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                 Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                              1.42
                                                                                                                                    2.80
                                                   1.64
                                                   41.48
   Conv. Total (cfs)
Length Wtd. (ft)
                                                                  Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                        482330.3
                                            6635506.0
                                                                                                              3848104.0
                                                                                                                                2305071.0
                                              1395.43
                                                                                                                                  551.19
                                                                                                              5262.38
   Min Ch El (ft)
                                              76.54
                                                                                                              0.24
                                                                                                                                  0.70
                                                                                                                                                     0.18
                                                                  Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                   1.48
   Alpha
Frctn Loss (ft)
                                                                                                                                      1.96
                                                                                                            179518.10
                                                                  Cum Volume (acre-ft)
                                                                                                                                 66062.18
                                                                                                                                                    211945.60
                                                               Cum SA (acres)
   C & E Loss (ft)
                                                   0.01
                                                                                                            22250.07
                                                                                                                                 2740.59
                                                                                                                                                 25199.48
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
               1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.
               Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
```

```
RIVER: Rio Grande
REACH: Lower Reach
```

| Descripti | on: | | | | | | | | |
|-----------|----------|---------|--------|---------|--------|----------|----------|---------|--------|
| Station E | levation | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 121.54 | 6.56 | 123.67 | 23.96 | 120.85 | 31.28 | 118.349 | 53.08 | 111.28 |
| 62.38 | 108.84 | 74.79 | 104.81 | 80.99 | 103.78 | 87.18 | 104.03 | 100.52 | 103.74 |
| 115.1 | 104.24 | 136.8 | 104 | 174.02 | 103.87 | 217.43 | 103.9 | 245.34 | 104.14 |
| 330.23 | 104.33 | 363.18 | 104.61 | 372.49 | 104.54 | 397.29 | 104.91 | 440.71 | 105.07 |
| 472.92 | 104.95 | 552.97 | 105.22 | 598.86 | 105.23 | 620.57 | 105.37 | 650.41 | 105.25 |
| 664.33 | 105.58 | 694.99 | 105.7 | 713.05 | 105.57 | 726.01 | 104.98 | 735.32 | 104.06 |
| 747.71 | 104.83 | 794.23 | 104.41 | 815.94 | 104.65 | 838.35 | 104.37 | 873.15 | 104.4 |
| 887.07 | 104.67 | 902.77 | 104.47 | 935.79 | 104.69 | 981.04 | 104.42 | 1008.89 | 104.7 |
| 1061.09 | 104.47 | 1116.77 | 104.62 | 1165.49 | 104.44 | 1242.06 | 104.85 | 1262.94 | 104.69 |
| 1304.7 | 104.91 | 1346.48 | 104.77 | 1370.84 | 105.22 | 1391.72 | 105.26 | 1405.64 | 105.7 |
| 1416.08 | 105.66 | 1454.36 | 106.05 | 1471.76 | 107.05 | 1482.2 | 107.15 | 1503.09 | 105.49 |
| 1510.05 | 105.25 | 1530.93 | 105.27 | 1551.81 | 105.69 | 1576.17 | 105.29 | 1600.54 | 105.98 |
| 1621.42 | 105.44 | 1631.86 | 105.64 | 1673.63 | 105.22 | 1692.693 | 105.1844 | 1725.83 | 104.89 |
| 1732.79 | 104.44 | 1753.67 | 104.58 | 1760.63 | 104.93 | 1795.43 | 104.88 | 1802.39 | 104.57 |
| 1826.75 | 104.79 | 1837.2 | 104.62 | 1875.49 | 105.03 | 1882.45 | 104.78 | 1896.37 | 104.92 |
| 1924.21 | 104.72 | 1952.05 | 104.8 | 1962.49 | 105.24 | 1979.89 | 104.62 | 2000.78 | 104.82 |
| 2011.22 | 105.23 | 2059.94 | 104.67 | 2070.38 | 104.87 | 2101.7 | 104.48 | 2129.54 | 104.88 |
| 2164.36 | 104.67 | 2178.28 | 105.1 | 2223.52 | 105 | 2244.4 | 104.77 | 2296.6 | 105.51 |
| 2310.52 | 105.01 | 2320.96 | 105.18 | 2345.32 | 106.69 | 2352.28 | 106.8 | 2373.16 | 106.23 |
| 2390.56 | 106.66 | 2401 | 106.11 | 2428.5 | 106.28 | 2456.69 | 106.13 | 2470.61 | 106.87 |
| 2481.05 | 106.99 | 2505.41 | 105.61 | 2529.78 | 106.03 | 2540.22 | 106.52 | 2561.1 | 106.7 |
| 2568.06 | 107.04 | 2605.25 | 106.69 | 2644.62 | 106.91 | 2672.46 | 106.65 | 2728.14 | 106.62 |
| 2766.43 | 107.02 | 2787.31 | 106.6 | 2797.75 | 105.67 | 2808.19 | 105.22 | 2828.52 | 105.03 |
| | | | | | | | | | |

```
2853.43 105.81 2884.34
                                                    105.66 2916.07
                                                                                    106.13 2940.44
                                                                                                                  107.24 2964.8
  2992.88
3073.51
                    106.5 3005.28
106.15 3097.05
                                                    107.04
                                                                  3039.4
                                                                                    107.8 3048.69
106.05 3128.37
                                                                                                                    106.5 3058
106.24 3138.81
                                                                                                                                       3058
                                                                                                                                                    106.99
  3177.09
                    106.37 3194.49
                                                    106.26 3215.37
                                                                                    106.84 3232.77
                                                                                                                    106.07 3257.13
                                                                                                                                                     106.04
  3291.93
                                                    106.55 3316.3
104.87 3462.47
                    106.28 3302.38
                                                                                    106.15 3368.11
                                                                                                                     105.54 3399.11
  3417.71
                    104.88 3441.59
                                                                                    104.36 3472.91
                                                                                                                    104.46 3511.19
                    104.53 3578.97
105.18 3723.49
                                                    104.51 3613.08
105.35 3730.45
                                                                                    104.88 3653.88
105.77 3758.29
                                                                                                                    105.11 3674.76
105.98 3772.21
  3702.61
                   106.24 3793.09
105.78 3957.3
106.09 4115.45
106.73 4217.67
107.39 4336
                                                    106.51 3813.97
105.72 3985.21
106.56 4130.96
  3782.65
                                                                                    105.97 3842.56
                                                                                                                    105.51 3889.07
106.1 4054.1
                                                                                                                    106.51 3889.07
106.1 4054.1
106.39 4165.47
108.36 4289.12
107.14 4410.06
108.87 4534.11
  4093.75
                                                                                    106.64 4144.59
                                                   106.56 4130.96
106.45 4249
106.93 4353.4
107.92 4478.29
110.23 4571.33
                                                                                    106.64 4144.59
108.24 4262.92
107.92 4391.69
108.17 4496.09
109.97 4600.51
  4308.16
                   107.39 4336
108.45 4457.81
109.04 4562.03
  4426.49
4549.62
                                                                                                                    111.78 4628.35
                   109.04 4562.03
110.32 4658.16
106.78 4771.05
106.5 4844.23
107.06 4909.35
107.57 4974.47
105.17 5066.89
106.77 5157.44
  4639.55
                                                    109.76 4670.56
105.92 4788.46
                                                                                    108.65 4689.16
106.01 4803.91
                                                                                                                    106.62 4708.4
105.45 4812.82
                                                    106.64 4853.53
106.24 4924.85
107.42 4983.35
                                                                                    107.33 4859.73
106.21 4945.07
106.91 5005.49
                                                                                                                    107.15 4890.74
107.14 4952.03
   4833.7
                                                                                                                                                     108.64
 4900.05
4962.47
                                                                                                                    107.63 5018.15
  5046
5139.97
                                                    105.89 5080.81
105.56 5163.64
                                                                                    105.64 5105.17
105.77 5176.05
                                                                                                                    106.24 5115.61
107.44 5197.76
                                                                                   103.77 5176.05
103.34 5265.98
102.02 5352.81
103.97 5455.15
97.21 5515.85
                                                   105.43 5234.97
100.78 5331.1
104.76 5435.81
 5203.95
5293.1
                    107.52 5213.26
101.73 5307.03
                                                                                                                    101.47 5275.7
103.38 5369.68
                                                                                                                                    5275.7
                   104.44 5383.6 104.76 5435.81 103.97 5455.15 104.75 5474.09 103.91 5495.46 99.55 5505.41 97.21 5515.85 96.14 5529.77 96.5 5557.4297.44787 5564.58 98.11 5579.2 100.76 5594.71 103.76 5621.02 103.32 5628.73 101.02 5646.73 91.99 5651.87 87.55 5683.23 86.46 5691.4481.09632 5692.9180.35841 5697.33
  5376.64
                                                                                                                                                       104.9
  5547.17
  5613.31
  5667.55
                      78.39 5722 59
                                                     78.07 5735.22 78.44 5761.9
81.99 5817.3981.92387 5823.61
                                                                                                                      78.3 5771.83
81.76 5881.1
  5709.96
  5808.26
                      78.28 5814.88
                                                   81.99 5817.398

84.4 5929

91.22 5972.48

97.66 6026.31

110.2 6059.42

107.84 6100.69

107.91 6163.99

107.58 6375.69
                                                                                                                      85.7 5945.9189.91332
95.27 5996.87 95.94
                     82.53 5915.43
90.75 5955.92
                                                                                     84.15 5937.25
95.04 5986.01
  5907.28
                                                                      5929
                                                                                                                    102.86 6040.3
109.31 6073.18
108.85 6125.46
109.13 6237.76
107.59 6430.9
106.43 6542.01
                                                                                    100.84 6032.16
109.42 6067.67
108.61 6119.95
                      97.32 6013.16
  6005.61
                   97.32 6013.16
109.88 6053.92
109.11 6092.44
108.47 6155.73
107.47 6339.18
107.15 6472.18
 6051.17
6086.94
                                                                                    109.11 6205.26
107.95 6422.65
  6147.47
  6307.08
                                                    106.33 6502.45
  6450.17
                                                                                    106.22 6529.83
                                                                                                                                                     106.13
                   107.15 6472.18
106.08 6596.01
105.37 6728.61
107.02 6838.14
106.14 6955.78
                                                                                    105.22 6529.83
105.33 6639.37
106.42 6789.46
106.32 6866.54
106.11 6996.34
                                                                                                                    105.04 6663.7
107.01 6801.63
105.99 6894.93
106.01 7045.02
                                                    105.68 6610.97
                                                    106.3 6750.11
106.47 6858.42
105.64 6980.12
  6683.99
                                                                                                                                                     106.76
 6813.79
6919.27
                                                                                    106.11 6996.34
106.48 7127.1
106.96 7292.21
108.78 7429.79
108.01 7561.88
108.3 7707.72
                   105.89 7085.59
106.82 7203.23
108.79 7373.61
                                                   106.28 7113.98
106.98 7239.74
108.93 7399.52
  7061.25
7195.12
                                                                                                                    106.85 7160.12
107.55 7311.47
                                                                                                                    108.92 7479.08
107.75 7588.61
  7347.24
                                                                                                                                                     108.38
                   108.49 7373.61 108.93 7399.52 108.49 7519.64 107.78 7548.12 107.67 7669.19 108.28 7682.96 111.54 7746.25 112.49 7763.04 121.91 7799.54 123.38 7807.66 124.75 7854.22127.9321 7861.84 111.69 7905.95 108.95 7919.74
  7495.31
                                                                                                                    109.18 7718.73
120.81 7779.28
123.18 7837.07
  7633.22
7740.75
7787.38
                                                                                                                                                     110.15
                                                                                    117.16 7775.21
123.64 7815.77
                                                                                                                    119.17 7884.67
102.48 7941.32
                                                                                    126.29 7875.63
106.27 7928.01
  7842.57
  7896.81
                     91.57 8101.67
91.56 8184.1
104.4 8239.51
                                                     91.56 8115.46
91.77 8196.25
107.8 8253.29
                                                                                                                      91.98 8145.78
99.98 8222.97
110.5 8277.17
  7961 55
                                                                                      92.09 8137.51
                                                                                    95.93 8216.47
110.24 8256.94
  8228.61
                                                                                                                                                     114.56
                   118.17 8297.4
116.15 8349.78
                                                    119.62 8305.5
114.26 8363.56
                                                                                    120.15 8313.59
113.47 8374.58
                                                                                                                    119.94 8325.72
112.37 8382.86
  8337.86
                                                                                                                                                     111.97
  8394.51
8447.12
                     112.8 8402.61
110.7 8459.26
                                                    112.08 8414.75
109.98 8499.72
                                                                                    109.83 8426.89
110.53 8511.86
                                                                                                                    109.62 8439.02
110.01 8528.05
                   108.31 8592.79
107.21 8708.15
  8564 46
                                                    108.36 8608.97
                                                                                    108.62 8639.23
                                                                                                                     108.12 8661.58
                                                    108.66 8727.44
107.51 8793.61
                                                                                     107.22 8738.46
                                                                                                                     106.99 8746.55
  8766.79
                    107.22 8774.88
                                                                                    106.53 8801.87
                                                                                                                    107.23 8819.39
                   106.62 8867.95
109.17 8964.52
                                                    107.43 8876.04
109.31 8972.79
                                                                                                                    108.05 8917.65
108.22 8994.85
                                                                                     107.43 8888.18
                                                                                    108.58 8983.82
  8936.95
                                                                                                                                                     108.47
                                                    107.75 9047.22
109.16 9149.22
                                                                                    108.02 9070.26
109.29 9165.75
                                                                                                                    107.91 9086.45
110.17 9198.83
  9003.11
                    108.04 9021.71
                  109.32 9130.96
110.37 9267.76
111.72 9322.89
  9114.78
                                                                                                                                                     109.98
                                                    111.1 9281.54
111.42 9337.33
                                                                                    110.88 9295.32
112.75 9357.56
                                                                                                                    112.52 9300.84
115.93 9369.7
  9253.97
                                                                                                                                                     112.67
                                                   113.24 9402.08 112.87 9418.25 113.16 9430.39
  9385.89 114.54 9393.98
Manning's n Values
                                         Sta
                                                    n Val Sta .066 1725.83
                                                                                   n Val Sta
.12 5628.73
                                                                                                                     n Val Sta
                       n Val Sta
.085 23.96
             0
                     .085
 7854.22
             a: Left Right 5613.31 6051.17
Rank Sta: Left
                                                    Lengths: Left Channel
                                                                                                    Right
                                                                                                                        Coeff Contr.
                                                                                                                                                     Expan.
                                                       1221.72 1587.5 1609.1
6.56 Elevation= 123.6
Left Levee
                               Station=
                                                                                                    123.67
                                Station= 7854.7
```

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 167.4

| INPUT | | | | | | | | | |
|-----------|----------|----------|-----------|-----------|----------|----------|---------|-----------|--------|
| Descripti | on: Batl | nymetric | elevation | ons trans | lated fi | rom IBWC | 2008 Cr | oss-secti | ons. |
| Station E | levation | n Data | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 123.11 | 22.96 | 116.06 | 32.79 | 112.43 | 49.19 | 107.69 | 59.03 | 106.09 |
| 72.15 | 102.41 | 78.71 | 101.6 | 85.26 | 103.02 | 91.82 | 103.43 | 114.78 | 104 |
| 137.73 | 103.5 | 177.09 | 103.61 | 190.2 | 103.86 | 223 | 103.64 | 252.51 | 103.99 |
| 278.75 | 103.86 | 304.98 | 104.06 | 347.61 | 103.99 | 377.13 | 104.19 | 386.97 | 103.95 |
| 413.2 | 104.19 | 419.76 | 104.04 | 459.11 | 104.33 | 482.07 | 104.11 | 527.98 | 104.1 |
| 547.66 | 104.25 | 626.36 | 104.24 | 649.32 | 104.5 | 688.67 | 104.5 | 728.02 | 104.91 |
| 747.7 | 104.72 | 760.82 | 104.3 | 770.66 | 102.07 | 783.77 | 103.14 | 813.29 | 102.95 |
| 832.96 | 102.55 | 855.92 | 102.96 | 875.6 | 102.61 | 918.23 | 102.63 | 934.63 | 102.89 |
| 947.74 | 102.68 | 990.37 | 102.84 | 1036.29 | 102.74 | 1055.96 | 102.89 | 1082.2 | 102.74 |
| 1177.3 | 102.95 | 1200.26 | 102.78 | 1249.45 | 102.91 | 1282.24 | 103.12 | 1351.11 | 103.13 |
| 1393.74 | 103.55 | 1400.3 | 103.45 | 1456.05 | 103.79 | 1492.12 | 104.45 | 1528.2 | 104.66 |
| 1551.15 | 104.6 | 1570.83 | 104.89 | 1610.18 | 104.88 | 1633.14 | 105.03 | 1659.37 | 104.95 |
| 1718.4 | 105.04 | 1728.24 | 105.15 | 1816.78 | 105.19 | 1839.74 | 105.1 | 1905.33 | 105.37 |
| 1918.44 | 105.22 | 1984.03 | 105.47 | 2006.99 | 105.24 | 2023.38 | 105.42 | 2105.37 | 105.36 |
| 2144.72 | 105.61 | 2154.56 | 105.49 | 2233.26 | 105.44 | 2292.29 | 105.71 | 2334.92 | 105.49 |
| 2374.27 | 105.87 | 2413.63 | 105.62 | 2430.02 | 105.83 | 2475.93 | 105.68 | 2531.68 | 105.95 |
| 2561.2 | 105.81 | 2567.76 | 105.96 | 2643.18 | 106.02 | 2669.41 | 105.9 | 2692.37 | 106.26 |
| 2705.49 | 106.04 | 2715.33 | 106.36 | 2748.12 | 105.97 | 2777.63 | 106.11 | 2784.19 | 105.95 |
| 2862.9 | 106.25 | 2872.73 | 106.1 | 2905.53 | 106.18 | 2931.76 | 106.59 | 2984.23 | 106.62 |
| 3000.63 | 107.4 | 3020.3 | 107.99 | 3043.26 | 107.85 | 3069.49 | 108.68 | 3102.29 | 108.88 |
| 3121.96 | 108.72 | 3141.64 | 109.2 | 3158.04 | 109.04 | 3171.15 | 109.46 | 3180.99 | 108.92 |
| 3197.39 | 108.7 | 3207.23 | 109.46 | 3217.06 | 108.4 | 3226.9 | 109.82 | 3243.3 | 108.8 |

```
3397.43
3571.23
                 108.37 3449.9
                                            108.51 3459.73
                                                                       108.34 3515.48
106.25 3620.42
                                                                                                  108.54 3554.84
106.17 3659.77
                                                                                                                             107.45
105.21
                                            104.83 3777.83
  3699.13
                 104.72 3741.76
                                                                       104.56
                                                                                   3813.9
                                                                                                  104.91 3827.02
                                                                                                                             104.77
                                            104.41 3941.8
105.59 4056.57
                                                                       104.74 3948.36
   3846.7
                 105.04 3886.05
                                                                                                   105.01 3984.43
  4013.94
                  105.3 4033.62
                                                                       104.66 4086.09
                                                                                                  104.62 4105.76
                 105.34 4177.91
105.53 4322.21
                                            105.14 4207.43
105.14 4345.16
                                                                       105.42 4240.22
105.79 4361.56
                                                                                                  105.37 4259.9
105.95 4368.12
  4305.81
                                           105.14 4345.16
105.65 4427.15
105.3 4538.65
105.37 4633.76
105.24 4728.86
107.34 4817.41
112.23 4886.27
  4384.52
                 105.81 4414.03
105.76 4528.81
                                                                       105.93 4450.11
105.51 4555.05
                                                                                                  105.29 4469.78
105.01 4564.89
                 104.84 4607.52
  4581.29
                                                                       104.74 4656.71
                                                                                                  104.56 4663.27
                                                                                                                               104.9
                104.84 4607.52
104.79 4699.35
106.33 4804.29
111.44 4879.72
109.62 4938.75
                                                                       105.09 4741.98
109.78 4827.25
                                                                                                  106.49 4771.49
109.31 4843.64
  4787.89
                                                                                                                             110.91
                                                                       111.96 4899.39
104.41 4958.42
                                                                                                  110.58 4919.07
   4866.6
  4932.19
                                            108.18 4951.86
                                                                                                  103.75 4984.66
   4994.5
                 103.37 5004.34
105.77 5115.84
                                            103.13 5046.97
106.55 5125.68
                                                                       103.63 5063.37
107.66 5132.23
                                                                                                  104.26 5073.2
107.13 5151.91
                 108.98 5165.03
104.41 5253.57
104.35 5335.56
                                           108.38 5174.87
105.29 5269.97
103.04 5348.68
                                                                                                  103.84 5201.1
105.87 5302.77
102.22 5378.19
  5158.47
                                                                       105.17 5184.71
                                                                                                                               103.8
                                                                        104.65 5286.37
   5312.6
                                                                       102.95 5368.36
                104.35 5333.56
102.74 5417.55
106 5489.7
96.4 5552.01
93.69 5653.67
                                           106.27 5430.67
106.36 5496.25
                                                                       105.58 5447.06
105.63 5506.09
                                                                                                  103.32 5453.62
102.03 5519.21
  5388.03
  5466.74
                                                                                                                                 99.3
                                             93.12 5561.84
96.12 5663.51
                                                                         92.71 5578.24
96.51 5670.07
                                                                                                    93.09 5604.48
97.57 5683.18
  5529 N5
  5630.71
                                           97.23 5725.82
97.9 5804.52
97.31 5893.07
100.17 5942.26
87.08 5990
                                                                         96.65 5752.05
95.55 5817.64
  5702.86
                  97.09 5715.98
                                                                                                    96.81 5761.89
                                                                                                                               97.78
                                                                                                   98.61 5909.47
97.09 5955.38
79.74 6010
                  96.35 5883.23
97.01 5929.14
88.99 5984.89
  5870.11
                                                                         98.84 5899.63
                                                                                                                               96.62
                                                                         98.65 5948.82
79.74 6000
 5916.03
5971.78
                  79.34 6040
78.04 6160
                                             78.94
77.34
                                                                        79.34 6080
77.24 6188.22
                                                                                                   78.94 6090
87.08 6194.78
      6020
                                                             6060
                                                             6180
       6140
                 95.18 6227.57
104.37 6270.21
109.97 6312.84
                                             99.17 6234.13
109.2 6273.49
                                                                                                  100.96 6250.53
108.69 6289.88
107.7 6339.07
                                                                      101.01 6243.97
109.98 6280.05
   6207.9
                                                                                                                               101.6
                                            108.33 6319.39
  6296.44
                                                                       105.93 6329.23
                                                                                                                             108.39
                109.97 6312.84
108.68 6358.74
109.78 6424.32
107.02 6575.16
106.07 6712.88
                                            108.22 6384.97
110.09 6453.83
                                                                       108.32 6391.53
109.91 6473.51
                                                                                                  107.06 6394.81
109.61 6539.09
  6404.65
                                            106.56 6614.5
106.48 6722.71
                                                                       106.68 6660.41
106.02 6745.67
                                                                                                  106.31 6693.2
106.16 6771.9
  6558 76
                                                                                                   106.16
                                            104.08 6837.48
  6801.41
                 104.29 6807.97
                                                                       103.96 6860.43
                                                                                                  103.64 6883.38
                104.29 6807.97
103.28 6919.45
102.75 7093.24
102.86 7306.38
103.66 7496.56
                                           103.4 6935.85
103.04 7103.08
103.3 7342.45
103.98 7539.19
  7067.01
7267.03
7470.33
                                                                       102.82 7132.59
103.27 7388.35
104.96 7552.31
                                                                                                  102.91 7185.05
103.72 7424.42
105.5 7591.65
                                                                                                                             103.26
                105.23 7667.07
109.35 7814.63
112.31 7939.23
111.39 8070.39
                                           105.64 7719.54
110.99 7853.98
112.33 7975.3
110.89 8080.23
 7624.44
7772
                                                                       106.37 7729.37
111.64 7876.93
                                                                                                  106.98 7749.05
111.79 7913
  7922.84
                                                                                                  112.04 8014.65
                                                                       111.83 7985.14
                                                                                                                             111.39
       8054
                                                                       110.94 8122.86
                                                                                                  110.39 8168.76
                110.28 8198.27
111.15 8270.42
119.83 8319.61
122.79 8385.19
127.94 8421.27
                                            110.5 8214.67
111.01 8283.54
119.89 8329.45
  8181.88
                                                                       110.15 8224.51
111.34 8290.09
122.19 8339.28
                                                                                                  110.41 8244.18
112.7 8303.21
121.63 8355.68
                                                                                                                              110.33
 8257.3
8309.77
                                                                                                                             122.04
  8365.52
8417.99
                                           122.71 8398.31
127.31 8427.82
                                                                       121.85 8404.87
124.12 8437.66
                                                                                                  123.08 8411.43
115.93 8444.22
                                           110.53 8467.18
91.51 8713.12
91.52 8821.34
  8450 78
                  110.6 8460.62
                                                                       109 44 8480 29
                                                                                                  104.49 8496.69
                                                                        91.51 8729.52
92.61 8834.46
                  91.52 8804.94
                                                                                                   92.59 8850.85
  8765.59
                                                                                                                               93.18
                                                                                                  107 8909.88
109.05 9008.26
                   94.02 8867.25
                                              97.52 8877.09
                                                                       102.21 8893.48
                                                                       109.36 8998.42
108.82 9057.45
110.6 9165.67
  8929.56
                 109.95 8955.79
                                            110.19 8975.47
                                                                                                                               107.8
                                            108.15 9047.61
110.3 9142.71
110 9287
  9024.66
                 108.38 9037.77
111.23 9119.76
                                                                                                  111.09 9077.12
111.14 9224.69
  9083.68
                                                                      109.74 9332.91
108.41 9434.57
                                                                                                  109.8 9352.59
108.97 9441.13
  9254 21
                 109.87 9270.6
                                           110 9287
108.08 9424.73
108.39 9496.88
109.7 9585.42
111.04 9706.75
                 108.41 9401.78
                                                                                                  108.54 9536.23
  9457.52
                 108.03 9464.08
                                                                       108.33 9523.11
                                                                                                                              107.86
                109.64 9578.86
111.08 9683.79
                                                                       109.43 9608.37
112.08 9713.31
                                                                                                  109.48 9647.72
111.99 9732.98
  9664.12
                                                                                                                              112.65
                112.56 9749.38
109.68 9837.92
                                            111.08 9762.5
110.04 9900.23
                                                                       110.34 9775.62
109.91 9946.14
                                                                                                  110.8 9785.45
110.41 9959.26
  9739 54
  9801.85
                                                                                                                              110.72
               112.6210018.28
114.8510116.66
                                           112.4710034.68
114.66 10126.5
114.7210182.25
                                                                                                  112.8610083.87
117.8210139.62
  9978 93
                                                                       112 87 10047 8
                                                                                                                              113 28
10100.27
                                                                       116.0810133.06
10152.73 115.7710165.85
                                                                       115.5810195.37
                                                                                                  115.6210224.88
                                           116.9910267.51
                                                                       118.0510280.63
Manning's n Values num= 6
Sta n Val Sta n Val Sta
0 .106 5870.11 .106 5929.14
6273.49 .13
                                                                       n Val
                                                                         .066 5990
                                                                                                      .015 6188.22
Bank Sta: Left Right Lengths: Left Channel Right 5929.14 6270.21 1756.68 2500 2391.12 Left Levee Station= 0 Elevation= 123.11 Station= 8417.99 Elevation= 127.94
                                                                                                     Coeff Contr.
                                                                                                                               Expan.
| Blocked Obstructions | num= 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | O | 3020.3 | 107.99 | 6296.4410293.74 | 109.97
CROSS SECTION OUTPUT Profile #Design Flow
                                              117.56
                                                                Element
   E.G. Elev (ft)
                                                                                                           Left OB Channel
                                                                                                                                                Right OB
   Vel Head (ft)
W.S. Elev (ft)
                                                                Wt. n-Val.
Reach Len. (ft)
                                                                                                              0.106
                                                  0.18
                                                                                                                                 0.041
   Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                               Flow Area (sq ft)
Area (sq ft)
                                               102 41
                                                                                                         64989.19
                                                                                                                            10720.50
                                                                                                                                               14398 24
                                           0.000214
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                           66119.77
                                           130000.00
                                                                 Flow (cfs)
                                                                                                                             54974.43
                                                                                                                                                  8905.79
                                             8282.76
                                                                Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                                               341.07
                                                 1.44
                                                                                                            1.02
                                                                                                                                  5.13
                                                                                                                                                    0.62
                                                               Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                 40.14
                                                                                                                               31.43
3753631.0
                                                                                                                                                      7 09
                                            8876346.0
                                                                                                           4514631.0
                                                                                                                                                    608083.6
                                                                                                                                                2032.74
                                                                                                                               355.73
                                             2165.80
                                                                                                           5918.46
   Min Ch El (ft)
                                                                                                                0.15
   Alpha
                                                  5.61
                                                                                                                0.15
                                                                                                                                   2.07
                                                                                                                                                     0.06
                                                                Cum Volume (acre-ft)
   Frctn Loss (ft)
                                                                                                         175855.80
                                                                                                                              65082.64
                                                                                                                                              25073.02
   C & E Loss (ft)
                                                                                                                             2708.67
                                                   0.03
                                                                Cum SA (acres)
                                                                                                         21937.06
```

Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 167

| Reacting Flowering Part | INPUT
Descripti | on: Bath | nvmetric | elevatio | ng trans | lated fr | rom TRWC | 2008 Cr | nss-secti | ons |
|---|--------------------|----------|------------------|----------|----------------|----------|----------|---------|----------------------|--------|
| 0 122.83 26.24 114.8 42.63 108.97 52.47 106.51 65.99 105.42 175.43 102.03 85.26 101.80 103.87 131.47 101.17 175.43 102.02 86.26 101.80 103.87 131.47 101.17 101.17 101.17 101.18 101.18 102.14 337.78 101.70 386.97 102.90 400.80 101.68 452.55 101.76 472.23 101.79 370.57 101.70 386.97 102.90 400.80 101.68 452.55 101.76 472.23 101.79 370.57 101.70 386.97 102.90 400.80 101.68 452.55 101.76 472.23 101.79 370.57 101.70 386.97 102.90 400.80 101.68 452.55 101.67 370.70 101.67 370.57 101.70 386.97 102.90 400.80 101.68 452.55 101.67 370.70 | | | | | | iacca II | LOW IDNO | 2000 CI | JDD DCCCI | OIID |
| 75.43 102.02 85.36 102.05 91.82 103.89 183.12 103.17 1713.61 103.47 215.45 103.87 245.25 103.8 | | | | | | | | | | |
| 173.81 103.34 216.44 103.83 242.67 103.86 288.68 17 102.09 401.85 101.25 318.11 102.14 337.98 104.57 101.75 388.67 102.09 401.80 10.1.65 511.1 104.03 587.01 104.57 623.08 104.04 731.8 104.67 741.1 104.18 760.61 103.65 767.37 104.17 870.55 104.01 803.45 104.5 823.12 104.56 104.67 731.8 104.67 741.1 104.18 760.8 104.60 731.1 104.1 104.18 760.8 104.60 731.1 104.1 104.18 760.8 104.60 731.1 104.1 104.18 760.8 104.60 731.1 104.1 104.18 760.8 104.60 731.1 104 | | | | | | | | | | |
| Section Color Co | | | | | | | | | | |
| 561.1 104.03 587.01 104.55 623.08 104.04 639.48 104.43 669.32 104.12 1082.13 104.64 741.8 104.18 749.80 104.61 741.8 104.18 749.8 104.64 741.8 104.18 749.8 104.64 741.8 104.18 749.8 104.64 741.8 104.18 749.8 104.64 741.8 104.18 749.8 104.64 741.8 104.8 | | | | | | | | | | |
| 682.11 104.32 718.18 104.19 731.3 104.64 741.14 104.18 750.98 104.65 761.73 104.17 760.61 103.65 767.73 104.17 760.61 103.65 767.73 104.18 760.98 104.65 760.61 103.65 760.61 76 | | | | | | | | | | |
| Total 103.62 767.37 104.17 787.05 104.01 803.45 104.55 823.12 104.56 823.12 104.57 823.12 10 | | | | | | | | | | |
| 1832.96 104.16 885.43 103.85 298.06 104.15 597.58 103.85 104.61 236.64 103.85 104.91 104.15 104.15 104.15 104.25 124.68 104.91 124.88 104.91 124.94 104.91 104.15 | | | | | | | | | | |
| 1187.13 104.21 1233.04 104.28 1242.88 104.91 1249.44 104.42 1311.75 104.15 | | | | | | | | | | |
| 1337.98 104.87 1360.94 104.37 1380.61 105.06 1400.29 104.08 1406.85 104.53 1436.36 104.26 14593.01 104.41 1450.26 105.01 105.01 104 | | | | | | | | | | |
| 1436.36 104.26 1459.32 104.44 1870.77 27 104.25 1511.79 104.64 1534.74 104.36 1651.34 104.7 1560.99 104.44 1570.76 104.25 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.86 1695.41 104.55 1671.49 104.57 104.87 10 | | | | | | | | | | |
| 1541.3 104.7 1566.98 104.44 1570.82 105.01 1563.93 104.54 1597.05 104.95 107.19 105.04 1747.9 105.01 167.01 | | | | | | | | | | |
| 1613.45 104.48 1646.24 105.01 1662.64 104.53 1672.48 104.86 1695.43 104.53 1882.81 104.17 104.85 1777.42 104.51 1882.81 104.18 1889.41 104.18 1889.41 104.53 1882.81 104.18 1889.41 104.53 1882.81 104.62 1882.81 105.25 104.62 104.62 1882.81 104.62 1882.81 105.25 104.62 104. | | | | | | | | | | |
| 1882.36 104.31 1898.75 105.04 1921.71 104.42 1954.5 104.71 1964.34 104.01 107.95 107.07 104.57 107.04 107.07 104.57 107.04 107.07 104.57 107.04 107.07 104.57 107.04 107.07 104.57 107.04 107.07 104.57 107.04 104.5 | | | | 105.01 | 1662.64 | | | | | |
| 1970.9 104.38 2013.53 104.11 2082.4 104.44 2092.23 104.05 2102.07 104.57 2215.03 104.02 2138.14 104.52 2138.33 104.57 2220.13 104.65 2220.13 | | | | | | | | | | |
| 2226.52 04.2 2138.14 104.5 2187.33 104.57 2203.73 104.21 2202.13 104.63 2236.52 104.63 2236.52 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.65 2135.23 104.67 2236.61 104.67 2246.03 104.77 2489.03 104.79 2274.48 104.95 2293.93 104.49 2459.51 104.65 2469.63 104.77 2489.03 104.72 2474.48 104.97 2774.33 104.62 2469.13 104.62 2469.63 104.85 2666.61 104.65 2469.65 104.95 2373.67 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.62 2373.63 204.65 204.65 204. | | | | | | | | | | |
| 2236.4 10.09.5 2391.9 104.65 2315.23 104.36 2328.34 104.61 2344.47 104.28 12494.87 104.36 2325.1 104.39 2554.61 104.52 2459.5 104.62 2459.5 104.62 2459.69 104.79 2459.69 104.99 2559.61 104.62 2459.69 104.99 2559.61 104.62 2559.69 104.99 2559.61 104.62 2559.69 104.99 2559.61 1 | | | | | | | | | | |
| 2498.87 104.36 2525.1 104.39 2558.61 105.27 2571.01 104.52 2590.69 104.79 2746.31 104.85 2663.48 104.97 2774.33 104.86 2790.72 105.03 2883.51 104.84 2875.99 104.62 2744.81 104.97 2774.33 104.86 2790.72 105.03 2883.51 104.84 2875.99 105.4 2746.81 104.97 2879.14 106.11 310.25 109.21 2312.03 307.73 107.73 1318.06 107.53 203.91 107.45 3249.82 107.63 3292.45 107.44 3351.48 107.63 3397.39 107.46 3243.65 107.71 346.28 107.63 3292.45 107.73 3343.54 107.63 2676.13 107.51 3695.81 107.65 3735.16 107.5 3807.3 107.73 3343.54 107.63 2676.13 107.51 3695.81 107.65 3735.16 107.5 3807.3 107.73 3343.54 107.63 2676.13 107.64 3828.64 108.43 3973.35 107.5 3807.3 107.73 3343.54 107.63 2676.13 107.64 3828.64 108.43 3973.51 107.65 4808.27 21 11.34 382.55 110.01 3915.52 109.85 3928.64 108.43 3973.51 107.65 4808.27 21 11.34 382.55 110.01 3915.52 109.85 3928.64 108.43 3973.51 107.69 4000.73 107.99 4017.18 107.65 41311.95 108.65 4138.19 107.66 417.85 107.95 42407.37 107.94 4230.31 109.44 246.73 107.87 4443.97 107.65 407.74 4413.79 107.65 407.74 4413.97 107.87 4423.97 107.87 4423.93 107.83 4495.95 108.24 4525.46 108.45 4525.40 108.27 4452.40 107.55 4083.91 107.65 4083.91 107.65 4083.91 107.85 4083.91 107.95 4083.91 107.85 4083.91 107.85 4083.91 107.85 4083.91 107.85 4083.91 107.85 4083.91 107.85 4083.91 107.95 4083.91 107.85 4083.91 107.95 4083.91 107.85 4083.91 107.85 4083.91 107.95 4083.91 107.85 4083.91 107.95 4083.91 107.85 4083.91 1 | | | | | | | | | | |
| 2623.4.8 104.39 2639.87 104.65 2666.11 104.65 2699.06 104.9 2731.69 105.4 2885.2 105 2954.69 104.65 2974.36 105.31 2994.04 104.84 2875.98 105.4 2885.2 105 2954.69 104.65 2974.36 105.31 2994.04 104.84 2875.98 105.4 2885.2 105.25 2954.69 104.65 2974.36 105.31 2994.04 104.89 2003.88 105.25 200.30 104.92 2008.14 106.13 2012.2 108.13 2994.04 104.89 2003.88 105.25 200.30 104.92 2008.14 106.13 2012.2 108.13 2994.04 104.89 2003.88 105.25 200.30 107.46 200.20 20 | | | | | | | | | | |
| 2744.81 104.97 2774.33 104.68 2790.72 105.03 2823.51 104.84 2875.98 105.25 2036.67 104.92 3089.14 105.11 3102.25 108.12 3121.93 107.57 3148.16 107.33 2039.11 107.45 249.82 107.63 2322.45 107.44 3351.48 107.63 2339.13 107.45 2462.83 | | | | | | | | | | |
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| 7763.95 99.84 7777.07 102.05 7806.6 102.89 7829.56 102.98 7852.52 102.55 7888.6 103.34 7898.44 102.75 7931.25 102.56 7947.65 102.94 7960.77 99.05 7990.29 99.36 8003.41 101.18 8019.82 100.72 8042.78 99.48 8085.42 99.92 8118.22 100.53 8144.47 99.55 8154.31 100.28 8160.87 99.58 8200.23 99.75 8213.35 99.23 8233.04 99.2 8265.84 99.78 8275.68 99.17 8242.88 98.89 8364.25 99.76 8374.09 98.9 8426.57 99.41 8449.53 99.03 8482.34 99.43 8502.02 100.3 8518.42 99.14 8541.38 100.04 8570.9 99.56 8587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.54 8774.28 99.21 8866.13 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 100.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9681.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.69 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 93.2410027.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 106.54 106.54 106.55 10 | | | | | | 99.96 | 7649.14 | 98.82 | | |
| 7888.6 103.34 7898.44 102.75 7931.25 102.56 7947.65 102.94 7960.77 99.05 7990.29 99.36 8003.41 101.18 8019.82 100.72 8042.78 99.48 8085.42 99.92 8118.22 100.53 8144.47 99.55 8154.31 100.28 8160.87 99.58 8200.23 99.75 8213.35 99.23 8223.04 99.2 8265.84 99.78 8275.68 99.17 8324.88 98.89 8863.42 599.76 8374.09 98.9 8426.57 99.41 8449.53 99.03 8482.34 99.43 8502.02 100.3 8518.42 99.14 8541.38 100.04 8570.9 99.56 88587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.56 88587.3 98.9 8633.23 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.69 9279.44 109.72 9305.68 109.4 99520.02 107.58 9568.11 105.9 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 95594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 109.3 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9866.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 98.210030.62 94.94 10312.73 144.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 112.3810024.06 98.2110030.62 94.94 10312.73 144.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.291050.98 107.6810509.54 107.52 114.4410489.86 109.291050.98 107.6810509.54 107.52 10855.92 107.59 108.74 | | | | | | 102 89 | 7731.15 | 100.02 | 7747.55 | |
| 7990.29 99.36 8003.41 101.18 8019.82 100.72 8042.78 99.48 8085.42 99.92 81818.22 100.53 8144.47 99.55 8154.31 100.28 8160.87 99.58 8200.23 99.75 8213.35 99.23 8233.04 99.2 8265.84 99.78 8275.68 99.17 8224.88 98.89 8364.25 99.76 8374.09 98.9 8426.57 99.41 8449.53 99.03 8482.34 99.43 8502.02 100.3 8518.42 99.14 84541.38 100.04 8570.9 99.56 8587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.54 8774.28 99.21 8866.13 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.69 9755.08 105.93 9781.32 108.74 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.99 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 93.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.3810024.06 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910266.33 113.44 110.7 30.85 114.4410319.29 116.310332.41 117.0310332.41 117.0310332.41 115.7310443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 114.4410319.29 116.31040.86 109.2910502.98 107.6810509.54 107.52 114.4410319.29 128.74 115.5995.98 108.74 115.5995.98 108.74 116.54 109.75 1 | | | | | | | | | | |
| 8213.35 99.23 8233.04 99.28 8265.84 99.78 8275.68 99.17 8324.88 98.89 8364.25 99.76 8374.09 98.9 8426.57 99.41 8449.53 99.03 8482.34 99.43 8502.02 100.3 8518.42 99.14 8541.38 100.04 8570.9 99.56 8587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.54 8774.28 99.21 8866.13 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.69 755.08 105.93 9781.32 108.74 110.7 9837.09 112.21 9843.65 113.19 9865.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | 99.36 | 8003.41 | 101.18 | 8019.82 | 100.72 | 8042.78 | 99.48 | 8085.42 | 99.92 |
| 8502.02 100.3 8518.42 99.14 8541.38 100.04 8570.9 99.56 8587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.56 8587.3 98.9 8663.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.54 8774.28 99.21 8866.13 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.39 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 129.53 9919.1 136.31 9938.78 138.32 9945.45 113.1410004.38 113.731007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 98.2110030.62 94.94 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 108.74 108.74 108.74 108.74 108.75 108.74 108.74 108.74 108.74 108.74 108.74 108.74 108.74 108.75 108.74 108 | | | | | 8154.31 | | | | | |
| 8502.02 100.3 8518.42 99.14 8541.38 100.04 8570.9 99.56 8587.3 98.9 8633.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.56 8587.3 98.9 8663.23 98.72 8702.11 98.75 8734.92 99.08 8744.76 99.54 8774.28 99.21 8866.13 99.01 9026.86 100.12 9053.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.39 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 129.53 9919.1 136.31 9938.78 138.32 9945.45 113.1410004.38 113.731007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 98.2110030.62 94.94 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 108.74 108.74 108.74 108.74 108.75 108.74 108.74 108.74 108.74 108.74 108.74 108.74 108.74 108.75 108.74 108 | | 99.23 | 8233.04 | 99.2 | 8426 57 | 99.78 | 8449 53 | 99 03 | 8482 34 | |
| 8866.13 99.01 9028.86 100.12 9033.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.69 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 103132.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | | | 99.14 | 8541.38 | 100.04 | 8570.9 | 99.56 | 8587.3 | |
| 8866.13 99.01 9028.86 100.12 9033.1 100.66 9072.79 107.18 9082.63 108.33 9099.03 108.81 9151.51 108.91 9167.91 109.57 9200.72 109.04 9230.24 109.6 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.69 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 103132.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | 8633.23 | 98.72 | 8702.11 | 98.75 | 8734.92 | 99.08 | 8744.76 | 99.54 | 8774.28 | 99.21 |
| 9279.44 109.72 9305.68 109.4 9354.89 109.49 9407.37 109.03 9413.93 107.29 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 105.93 9781.32 108.74 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10340.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values num= 5 | | | | | | | | 107.18 | 9082.63 | |
| 9427.05 106.6 9446.74 107.75 9509.06 107.78 9532.02 107.58 9568.11 105.9 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 129.53 9919.1 136.31 9938.78 138.32 9945.54 113.141.0004.38 113.731007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 98.2110030.62 94.94 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 10.88 10.89 | | | | | | | | | | |
| 9581.23 105.83 9594.35 104.99 9620.59 104.97 9630.43 104.23 9640.27 104.75 9669.79 104.07 9725.56 104.64 9738.68 104.6 9755.08 105.93 9781.32 108.74 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 112.040.27.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | | | 107.75 | 9509.06 | 107.78 | 9532.02 | 107.58 | 9568.11 | |
| 9817.41 110.7 9837.09 112.21 9843.65 113.19 9856.77 117.94 9869.89 124.18 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10240.55 101.7610247.12 106.0410210.04 91.44 10217.6 98.2110030.62 94.94 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 10.066 5529.58 | 9581.23 | 105.83 | 9594.35 | 104.99 | 9620.59 | 104.97 | 9630.43 | 104.23 | 9640.27 | 104.75 |
| 9879.73 125.15 9886.29 127.26 9902.69 129.53 9919.1 136.31 9938.78 138.32 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.141.0004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | | | | | | | | | |
| 9945.34 137.57 9951.9 133.17 9965.02 122.95 9974.86 116.53 9984.7 113.52 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.081036521 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | | | | | | | | | |
| 9994.54 113.1410004.38 113.7310007.66 112.3810024.06 98.2110030.62 94.94 10043.75 91.6310047.03 91.4410211.04 91.44 10217.6 93.2410227.44 99.81 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 114.57 10394.74 10394.74 10394.74 10394.74 10394.74 10394.74 10473.46 109.2910502.98 107.6810509.54 107.52 114.410489.86 109.2910502.98 107.6810509.54 107.52 114.57 10473.46 109.2910502.98 107.6810509.54 107.52 114.57 10473.46 109.2910502.98 107.6810509.54 107.52 114.57 10473.94 107.52 11 | | | | | | | | | | |
| 10240.56 101.7610247.12 106.0410260.24 112.1410263.52 112.7910296.33 113.44 10312.73 114.4410319.29 116.310332.41 117.0310352.09 113.0810365.21 114.57 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | 9994.54 | 113.143 | 10004.38 | 113.73 | L0007.66 | 112.381 | 10024.06 | 98.21 | 10030.62 | 94.94 |
| 10394.74 116.3 10401.3 114.5610407.86 114.0610427.54 115.7110443.94 116.14 10473.46 115.7410480.02 114.461049.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values | | | | 91.441 | 10211.04 | 91.44 | 10217.6 | 93.24 | 10227.44 | |
| 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values num= 5 Sta n Val | | | | 116 2 | LUZ6U.24 | 117 021 | 10352 00 | 113 08 | 10296.33
10365 21 | |
| 10473.46 115.7410480.02 114.4410489.86 109.2910502.98 107.6810509.54 107.52 Manning's n Values num= 5 Sta n Val | | | | 114.56 | 10407.86 | 114.061 | 10427.54 | 115.71 | 10443.94 | |
| Sta n Val Sta n Val <th< td=""><td></td><td></td><td></td><td>114.44</td><td>L0489.86</td><td>109.291</td><td>10502.98</td><td>107.68</td><td>10509.54</td><td></td></th<> | | | | 114.44 | L0489.86 | 109.291 | 10502.98 | 107.68 | 10509.54 | |
| Sta n Val Sta n Val <th< td=""><td></td><td> 3</td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td></th<> | | 3 | | | _ | | | | | |
| 0 .085 26.24 .066 5529.58 .025 5712.51 .066 9938.78 .085 Bank Sta: Left Right 5414.15 5995.98 left Channel Right 2 Coeff Contr. Expan. Ineffective Flow num 2 Sta L Sta R Elev Permanent 0 5414.15 109.75 T 5995.9810509.54 108.74 Left Leve Station 0 Elevation 122.83 | | | | | | n Val | Sta | n Val | St a | n Val |
| Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5414.15 5995.98 1855.62 2500.27 1953.43 .1 .3 Ineffective Flow nume 2 Sta L Sta R Elev Permanent 0 5414.15 109.75 T 5995.9810509.54 108.74 T Left Levee Station= 0 Elevation= 122.83 | | | 26.24 | .066 | 5529.58 | .025 | 5712.51 | .066 | 9938.78 | |
| Star | | | | | | | | | | |
| Star | | Left | Right | Lengths | 3: Left C | nannel | Right | Coefi | Contr. | |
| 0 5414.15 109.75 T
5995.9810509.54 108.74 T
Left Leve Station= 0 Elevation= 122.83 | 54
Ineffecti | ve Flow | של.ככי
בmilm= | | ⊾ວວວ.⊽∠ 2
2 | | 1903.43 | | . 1 | . 3 |
| 0 5414.15 109.75 T
5995.9810509.54 108.74 T
Left Leve Station= 0 Elevation= 122.83 | Sta L | Sta R | Elev | Permane | ent | | | | | |
| Left Levee Station= 0 Elevation= 122.83 | 0 | 5414.15 | 109.75 | T | | | | | | |
| Right Levee Station= 9938.78 Elevation= 138.32 | 5995.981 | U5U9.54 | 108.74 | T | רום. | wation- | 122 22 | | | |
| | Right Leve | ee S | Station= | 9938.78 | | | | | | |
| CROSS SECTION OUTPUT Profile #Design Flow | | | | | | | | | | |

CROSS SECTION OUTPUT Profile #Design Flow

INPUT

| E.G. Elev (ft) | 117.11 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|-----------|----------|-------------|
| Vel Head (ft) | 0.07 | Wt. n-Val. | 0.066 | 0.055 | 0.066 |
| W.S. Elev (ft) | 117.04 | Reach Len. (ft) | 1855.62 | 2500.27 | 1953.43 |
| Crit W.S. (ft) | 99.15 | Flow Area (sq ft) | 39224.66 | 15419.89 | 31461.10 |
| E.G. Slope (ft/ft) | 0.000176 | Area (sq ft) | 60431.02 | 15419.89 | 55564.82 |
| Q Total (cfs) | 130000.00 | Flow (cfs) | 43914.33 | 48147.82 | 37937.85 |
| Top Width (ft) | 9835.36 | Top Width (ft) | 5395.23 | 581.83 | 3858.30 |
| Vel Total (ft/s) | 1.51 | Avg. Vel. (ft/s) | 1.12 | 3.12 | 1.21 |
| Max Chl Dpth (ft) | 45.76 | Hydr. Depth (ft) | 7.27 | 26.50 | 8.15 |
| Conv. Total (cfs) | 9811981.0 | Conv. (cfs) | 3314512.0 | 3634042. | 0 2863427.0 |
| Length Wtd. (ft) | 2108.68 | Wetted Per. (ft) | 5399.64 | 603.43 | 3870.64 |
| Min Ch El (ft) | 71.28 | Shear (lb/sq ft) | 0.08 | 0.28 | 0.09 |
| Alpha | 1.96 | Stream Power (lb/ft s) | 0.09 | 0.87 | 0.11 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 173326.90 | 64332.52 | 208854.20 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 21709.10 | 2682.19 | 24911.37 |

Note: Note:

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

| RIVER: Ri
REACH: Lo | | | RS: 166 | 5.6 | | | | | |
|------------------------|------------------|--------------------|------------------|----------------------|----------|----------------------|------------------|----------------------|------------------|
| INPUT | | | | | 11.6 | TD110 | 0000 0 | | |
| Descripti
Station E | | | num= | ons trans
460 | lated fi | rom IBWC | 2008 Cr | oss-secti | ons |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 115.83 | 16.4 | 121.78 | 26.24 | 122.95 | 39.37 | 122.83 | 55.77 | 117.64 |
| 68.89
147.62 | 114.38
103.64 | 88.57
173.87 | 106.68
102.88 | 121.38
216.52 | 100.53 | 131.22
269.01 | 100.1
103.23 | 137.78
282.13 | 102.18
103.58 |
| 344.46 | 103.25 | 383.83 | 103.94 | 423.19 | 103.52 | 475.68 | 103.65 | 492.08 | 104.23 |
| 508.49 | 103.65 | 557.7 | 103.91 | 574.1 | 103.56 | 652.83 | 103.82 | 659.39 | 104.22 |
| 695.48
984.17 | 103.36 | 764.37
1007.13 | 103.66 | 849.67
1043.22 | 103.64 | 885.75
1095.71 | 104.03 | 934.96
1105.55 | 103.67
104.02 |
| 1131.8 | 103.75 | 1138.36 | 104.15 | 1190.85 | 103.43 | 1197.41 | 103.66 | 1243.33 | 103.7 |
| 1253.18 | | 1292.54 | | 1305.67 | | 1348.31 | | 1364.72 | 104.14 |
| 1387.68
1512.34 | | 1413.92
1522.18 | | 1433.61
1541.87 | | 1453.29
1554.99 | | 1482.82
1581.23 | 103.79
103.69 |
| 1604.2 | | 1623.88 | | 1640.28 | | 1663.25 | 103.75 | 1722.3 | 104.08 |
| 1728.86 | 104.46 | 1755.1 | | 1764.95 | | 1794.47 | | 1833.84 | 104.76 |
| 1869.93
2050.36 | | 1912.57
2086.44 | | 1922.41 2112.69 | 104.29 | 1958.5
2129.09 | | 1997.87
2148.77 | 103.98 |
| 2214.38 | | 2243.91 | | 2302.96 | | 2322.64 | | 2362.01 | 103.66 |
| 2414.5 | | 2444.02 | | 2457.15 | | 2470.27 | | 2486.67 | 104.21 |
| 2509.64
2703.19 | 103.87 | 2549
2742.55 | | 2601.49
2762.24 | 104.15 | 2621.17
2768.8 | | 2693.35
2811.45 | 104.13
103.92 |
| 2827.85 | | 2854.09 | | 2896.74 | | 2909.86 | | 2929.55 | 103.92 |
| 2972.19 | 104.27 | 2998.44 | 103.82 | 3034.52 | 104.31 | 3083.73 | 103.9 | 3103.42 | 104.44 |
| 3139.5 | | 3188.71 | 105.06 | 3224.8 | | 3244.48 | 106 | 3257.6 | 107.81 |
| 3270.72
3411.79 | | 3296.97
3447.87 | | 3303.53
3474.12 | | 3339.62
3500.36 | | 3356.02
3513.49 | 108.09
108.48 |
| 3539.73 | | 3575.82 | | 3588.94 | | 3621.74 | | 3641.43 | 108.13 |
| 3664.39 | | 3700.48 | | 3710.32 | | 3720.16 | | 3756.25 | 107.93 |
| 3815.3
3900.59 | | 3825.14
3907.15 | | 3851.38
3920.27 | | 3861.22
3953.08 | | 3887.47
3979.32 | 109.3 |
| 4028.53 | | 4061.34 | | 4100.71 | | 4185.99 | | 4238.48 | 105.5 |
| 4258.16 | | 4281.12 | | 4300.81 | | 4317.21 | | 4350.01 | 110.31 |
| 4359.85
4491.07 | | 4382.82
4563.23 | | 4409.06
4576.36 | 108.14 | 4418.9
4592.76 | 106.91
106.76 | 4441.86
4602.6 | 106.43
107.12 |
| 4664.93 | | 4674.77 | | 4779.74 | 107.58 | 4802.7 | | 4822.38 | 107.12 |
| 4960.16 | 107.93 | 4986.4 | 107.81 | 5002.8 | | 5048.73 | 107.85 | 5058.57 | 108.39 |
| 5081.53
5357.08 | 108.34 | 5120.9
5416.13 | 106.08 | 5153.7
5507.98 | | 5206.18 | | 5334.12
5550.62 | 105.59 |
| 5570.3 | | 5629.35 | | 5671.98 | | 5527.66
5763.84 | 106.04 | 5770.4 | 105.8
106.4 |
| 5809.77 | | 5829.45 | 106.37 | 5878.66 | 105.9 | 5908.18 | 106.41 | 5940.98 | 106.01 |
| 5957.38 | | 6013.15 | | 6036.11 | | 6065.64 | | 6114.84 | 106.26 |
| 6124.68
6249.34 | 106.55 | 6144.36 6272.3 | | 6180.45
6324.78 | | 6203.41
6351.03 | | 6232.93
6364.15 | 107.85 |
| 6387.11 | | 6410.07 | | 6429.76 | 100.28 | 6439.6 | | 6459.28 | 94.66 |
| 6472.4 | | 6492.08 | | 6518.33 | | 6544.57 | | 6560.97 | 107.27 |
| 6577.37
6669.22 | | 6593.77
6698.74 | | 6603.61
6708.59 | | 6636.42
6718.43 | | 6652.82
6728.27 | 107.37
106.72 |
| 6741.39 | | 6774.19 | | 6790.59 | | 6810.28 | | 6826.68 | 106.71 |
| 6833.24 | | 6843.08 | 106.73 | 6856.2 | 106.94 | | | 6905.41 | 105.05 |
| 6915.25
7003.82 | | 6921.81
7112.08 | | 6934.93
7131.76 | | 6948.05
7164.57 | | 6967.73
7177.69 | 105.3
103.96 |
| 7246.58 | | 7269.54 | | 7279.39 | | 7348.28 | | 7374.52 | 105.05 |
| 7423.73 | | 7443.42 | | 7449.98 | | 7456.54 | | 7472.94 | 104.52 |
| 7489.34
7564.8 | 102.38 | 7502.47
7597.6 | | 7518.87
7617.29 | | 7531.99
7623.85 | 104.92 | 7548.4
7630.85 | 104.8 |
| 7637.85 | | 7657.85 | | 7677.85 | | 7687.85 | | 7697.85 | 73.61 |
| 7757.85 | | 7777.85 | | 7787.85 | | 7797.85 | | 7801.85 | 80.15 |
| 7836.85
7896.14 | | 7860.05
7912.54 | | 7866.61
7968.31 | | 7879.74
8060.17 | | 7883.02
8109.38 | 103.78
102.87 |
| 8132.34 | | 8194.67 | | 8230.76 | | 8237.32 | | 8286.52 | 103 |
| 8319.32 | | 8375.09 | | 8417.73 | | 8453.82 | | 8493.18 | 101.93 |
| 8532.54
8801.52 | | 8594.87
8860.57 | 101.82 | 8657.19
8939.3 | 101.8 | 8699.84
8972.1 | | 8749.04
8985.22 | 101.68
98.95 |
| 9008.18 | | 9024.58 | | 9047.54 | | 9067.23 | | 9083.63 | 99.33 |
| 9096.75 | | 9109.87 | | 9119.71 | | 9139.39 | 100.48 | 9188.6 | 100.85 |
| 9198.44
9303.41 | | 9237.8
9316.53 | | 9250.92
9339.49 | | 9264.04
9362.45 | | 9293.57
9408.38 | 100.36 |
| 9431.34 | | 9447.74 | 98.98 | 9454.3 | | 9473.98 | | 9513.34 | 99.55 |
| 9536.31 | 101.07 | 9546.15 | 100.27 | 9575.67 | 99.05 | 9592.07 | 100.24 | 9615.03 | 99.45 |
| 9657.68 | | 9674.08 | | 9697.04 | | 9713.44 | 100.38 | 9726.56 | 99.27 |
| 9749.52
9847.93 | | 9775.77
9857.77 | | 9788.89
9864.33 | | 9811.85
9897.14 | | 9828.25
9916.82 | 100.14 |
| 9923.38 | | 9956.18 | 100.51 | 9962.74 | 99.95 | 9998.82 | 99.32 | 10018.51 | 99.44 |
| 10041.47 | | 0077.55 | | 10087.39 | | 10110.35 | | 10133.32 | 100.99 |
| 10146.44
10254.69 | | .0175.96 | | L0205.48
L0290.77 | | 10225.16
10333.41 | | 10244.84
10349.81 | 99.66
100.13 |
| 10372.78 | | 10385.9 | | 10392.46 | | 10405.58 | 101.71 | 10412.14 | 103.13 |
| 10425.26 | | 0438.38 | | 10454.78 | | 10481.02 | | 10494.15 | 110.09 |
| 10503.99
10602.39 | | .0513.83 | | L0536.79
L0654.88 | | 10549.91
10674.56 | | 10592.55
10690.96 | 111.18 |
| 10717.2 | | .0727.04 | | L0034.88 | | 10756.57 | 109.32 | 10766.41 | 109.59 |
| 10818.89 | 109.291 | 0835.29 | 110.063 | L0854.98 | 109.15 | 10884.5 | 109.62 | 10910.74 | 109.61 |
| 10920.58
11045.23 | | .0943.54 | | L0963.22
L1084.59 | | 10986.19
11104.28 | | 10999.31
11143.64 | 108.87
107.98 |
| | | | | | | | | | |
| | | | | | | | | | |

```
11166.6 108.5811192.84 107.5811255.17
11350.3 108.8511376.54 107.82 11415.9
                                                                108.2511425.74
                                                                                         108.7311461.83
                                                                                                                    107.8
                                                                114.2811635.68
                                                                                         120.4911645.52
11602.88
               110.7211612.72
                                        111.6211622.56
                                                                                                                  123.92
               123.6111694.73
                                        126.3311707.85
                                                                  123.911734.09
                                                                                          123.8911740.65
11747.21
               115.5711757.05
                                        113.5511776.73
                                                                 112.7811789.85
                                                                                         106.6111802.97
                                      91.4111947.31
112.7511993.23
                 91.411944.03
                                                                  92.0211953.87
                                                                                          101.1411966.99
               115.811986.67
                                                               113.0112019.47
                                                                                        111.4612042.43
12088.36 111.82 12098.2 111.6 12114.6 112.2712196.61 12226.13 108.4612239.25 107.4212255.65 107.6312278.61
                                                                                           112.412216.29
                                                        5
Sta n Val Sta
0.85 .015 7801.85
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .118 7502.47 .066 7630.85
                                                                                          n Val Sta
.066 7879.74
Bank Sta: Left Right Lengths: Left Channel Right
7531.99 7879.74 417.48212330.936 2564.68
Left Levee Station= 26.24 Elevation= 122.95
Right Levee Station=11694.73 Elevation= 126.33
                                                                                            Coeff Contr.
                                                                                                                    Expan.
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | 0 | 7531.99 | 105.44 | 7896.1412291.74 | 103.36
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                 Left OB Channel
                                                                                                                                   Right OB
                                                          Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                    0.118
   Vel Head (ft)
                                              0.08
                                                                                                                     0.045
                                                                                                                                      0.132
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                  2330.94
                                                                                                                                   2564 68
                                       116.69
                                                                                               417.48
78646.88
  Crit W.S. (ft) 98.82
E.G. Slope (ft/ft) 0.000144
Q Total (cfs) 13000.00
Top Width (ft) 11568.05
Vel Total (ft/s) 0.98
Max (hl Deth (ft)
                                                                                                                                  42598.07
                                                                                                                11251.12
                                                         Area (sq ft)
Flow (cfs)
                                                                                               78646.88
                                                                                                                11251.12
                                                                                                                                  42598.07
                                                                                                                                   29045.64
                                                                                                 57202.01
                                                                                                                  43752.35
                                                         Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Velume (aggraft)
                                                                                                 7472.39
                                                                                                                   347.75
                                                                                                                                   3747.91
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                             43.08
                                                                                                    10.52
                                                                                                                     32.35
                                                                                                                                      11.37
                                        10842970.0
                                                                                                                     3649272.0
                                        1512.41
                                                                                                 7476.85
                                                                                                                   360.22
                                                                                                                                   3751.27
   Min Ch El (ft)
                                             73 61
                                                                                                      0 09
                                                                                                                      0 28
                                                                                                                                        0 10
                                                                                                      0.07
                                              5.64
                                                                                                                       1.09
   Alpha
   Frctn Loss (ft)
                                                                                               170364.60
                                              0.29
                                                          Cum Volume (acre-ft)
                                                                                                                  63567.08
                                                                                                                                   206653.20
                                                          Cum SA (acres)
                                                                                                                  2655.51
             Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
```

107.3911310.93

Note:

Note:

CROSS SECTION

RIVER: Rio Grande

RS: 166 REACH: Lower Reach

Description: New Cross-Section, Bathymetric elevations translated from Corrected Effective XS

Station Elevation Data num= 460
 num=
 46U
 Sta
 Elev
 Sta
 Sta
 Sta
 Sta
 Sta< Sta Sta Elev 0 109.71 18.91 82.2 115.15 14.53 98.77 98.6 160.94 144.53 246.24 103.45 265.92 374.19 104.02 410.28 103.55 659.62 103.67 879.43 104.16 1050.03 577.6 103.42 616.97 103.56 738.36 103.94 981.13 103.81 840.06 103.79 1000.82 938.48 103.72 1099.24 1151.73 1309.21 103.56 1171.42 104.38 1348.58 104.26 1184.54 104.02 1381.39 103.73 1237.04 104.23 1394.51 103.88 1273.12 104.69 1424.04 104.23 1394.31 104.39 1548.71 104 1650.41 104.47 1791.49 104.66 1903.03 1483.09 1607.76 103.84 1499.5 104.21 1617.61 103.98 1768.52 104.35 1522.46 104.58 1634.01 104.9 1558.55 104.21 1706.19 1735.71 104.65 1781.64 105.29 1821.01 104.96 1870.22 104.04 1971.93 104.13 1880.07 104.6 2004.74 104.8 1919.44 104.17 2030.98 1830.86 103.79 2017.86 1962.09 103.5 104.6 2004.74 104.02 2086.76 103.32 2198.3 103.79 2322.97 103.29 2450.92 104.52 2565.75 103.52 2080.19 103.88 2188.46 103.63 2106.44 103.74 2214.71 103.96 2145.81 103.19 2254.08 2063.79 2165.5 104.41 103.46 2313.13 103.32 2424.68 103.57 2336.1 103.66 2483.73 104.43 2345.94 103.38 2513.26 2280.32 103 88 2385.31 103 47 2552 63 2526 38 103.75 2585.44 103.72 2595.28 103.47 2552.63 103.88 2634.65 103.91 2765.88 103.75 2920.08 103.82 3070.99 104.52 2565.75 103.58 2674.02 102.71 2779 103.65 2952.89 104.2 3130.05 103.94 2703.55 104.15 2834.78 103.41 2729.79 104.06 2841.34 2756.04 2880.71 3041.47 104.02 3005.38 103.91 3159.58 103.95 3021.78 104.36 3205.51 106.78 3336.74 106.14 3579.52 106.67 3681.22 106.15 3855.1 104.51 3983.05 3228.47 3379.39 106.13 3251.44 106.55 3389.23 106.68 3294.09 106.17 3523.74 106.28 3323.61 106.43 3553.27 106.17 3323.74 106.21 3641.85 106.38 3812.45 103.35 3904.31 106.24 3668.1 106.53 3825.58 103.21 3963.37 106 79 3612 32 3586 08 106.99 3887.91 3874.79 105.8 4061.79 106.04 4137.25 105.8 4071.63 106.86 4147.09 106.57 4081.48 106.09 4183.18 106 4091.32 106.27 4209.43 4042.11 4114.29 4222.55 106.12 4261.92 108.4 4389.87 106.31 4317.69 107.07 4409.55 106.89 4334.1 107.62 4445.64 106.51 4353.78 107.18 4478.45 107.07 4409.55 106.74 4540.78 107.45 4688.42 107.47 4947.6 105.19 5193.66 105.25 5551.26 105.44 5869.49 107.41 4514.54 107.13 4616.24 107.32 4934.48 105.44 5154.29 105.17 5328.17 106.97 4544.06 107.21 4717.95 107.75 5055.86 107.57 4567.03 107.56 4829.49 4507.98 107 2 108.13 5068.99 4862.3 105.45 5236.31 105.48 5420.03 105.26 5246.15 105.77 5439.71 5088.67 5295.36 5475.8 5718.58 105.49 5488.92 105.54 5787.47 105.57 5607.03 105.93 5892.46 105.4 5695.61 105.7 5912.14 107.13 6161.48 107.67 6223.81 108.16 6299.27 105.74 6036.81 107.48 6177.88 5921.98 105.98 6118.83 105.7 6138.52 106.94 6194.29 108.01 6213.97 6168.04 6233.66 106.81 6243.5 105.93 6259.9 107.47 6276.31 109.4 6332.08 107.3 6410.82 109.13 6351.76 105.89 6423.94 109.62 6361.61 106.06 6433.78 108.96 6374.73 103.99 6450.19 6391.13 107.3 6410.82 103.44 6492.84 104.59 6627.35 103.59 6719.21 103.46 6912.77 6476.43 6614.23 104.18 6515.8 104.4 6640.47 103.79 6545.33 105.73 6653.59 104.12 6594.54 103.79 6683.12 103.79 6063.12 103.33 6873.41 104.39 6961.99 103.88 7057.13 106.12 7132.59 104 7247.41 103.4 6752.02 104.14 6932.46 6702.81 103.74 6797.95 103.94 6948.86 105.18 7017.76 103.79 7106.34 104.16 7185.08 105.27 7040.72 104.97 7119.46 103.71 7234.29 6991 51 104.05 7001.36 104 7076.81 105 03 103.71 7178.52 7148.99 104.62 7342.55 105.03 7358.96 105.07 7431.14 104.78 7470.5 103.88 7293.34 105.35 7385.2 105.26 7313.03 104.51 7401.61 7368.8 105.35 105.35 7506.59 106.61 7568.93 106.44 7526.28 106.28 7545.96

```
105.06 7792.02
                104.18 7851.07
107.82 8021.67
                                                                                          107.34 7946.21
108.59 8120.1
 7834.67
                                        104.57 7874.04
                                                                  105.83 7887.16
                                                                                                                    108.45
                                        107.82 8202.11
                                                                                          108.13 8287.42
108.4 8418.65
   8152.9
                 108.3 8182.43
                                                                  108.53 8221.8
                                                                                                                    108.91
                                                                  107.99 8395.68
 8303.82
                108.18 8330.07
                                         108.33 8336.63
                                                                                           108.14 8533.48
 8431.77
                108.86 8451.46
                                          107.9 8467.86
                                                                  107.76 8520.35
                108.45 8559.72
104.41 8661.43
                                        112.22 8572.85
103.55 8740.17
                                                                  112.89 8589.25
103.81 8825.47
                                                                                           112.34 8605.66
103.62 8861.56
 8628.62
 8904.21
               103.59 8966.55
103.95 9169.77
                                        103.81 9012.43
111.85 9176.32
                                                                  103.44 9061.6
112.66 9202.55
                                                                                          103.82 9130.43
113.16 9218.94
                                                                                          108.16 9300.88
106.6 9359.88
100.04 9441.82
87.55 9527.05
76.78 9567.61
                                        108.82 9271.38
 9235.32
                110.15 9261.55
                                                                  109.05 9281.21
               110.15 9261.55
106.22 9330.38
101.36 9386.1
99.02 9474.6
87.23 9533.61
                                        108.82 9271.38
106.4 9336.94
100.47 9412.32
98.22 9490.99
83.89 9540.61
                                                                  105.24 9353.32
100.57 9425.43
 9376.27
                                                                   92.64 9513.93
77.82 9547.61
 9458.21
                                                                                                                       85 9
 9527.05
                                        72.28 9607.61
90.48 9759.77
106.77 9822.05
106.68 9966.27
104.87 10182.6
                                                                   71.28 9647.61
95.38 9772.88
107.1 9848.27
                                                                                          71.28 9726.99
100.66 9782.71
106.89 9874.49
 9587.61
                 71.58 9597.61
86.54 9743.38
               107.85 9795.82
106.49 9940.04
 9785.99
                                                                 106.3210051.49
105.0910238.32
                                                                                            10610084.27
104.510287.49
 9920.38
10146.55
                105.2510166.21
                                                                                                                     104.8
10303.88
               105.4510326.82
104.3210526.77
                                        104.6810392.38
103.9710543.16
                                                                 104.610444.82
104.1410575.94
                                                                                          104.28 10477.6
103.85 10625.1
                                                                                                                    104.81
                                        104.110779.16
103.1410985.66
107.7411162.66
107.3211326.55
10664.44
10929.94
               103.8910710.32
103.3710962.71
                                                                  103.5610815.21
103.6711015.16
                                                                                          103.5610887.33
104.9611051.21
                                                                 108.0611188.88
108.81 11362.6
112.9711411.77
11070.88
                 108.111133.16
                                                                                              108 11215.1
                                                                                           107.0311375.71
                                                                                          112.9311428.16
109.4911578.94
110.2911752.66
11388.83
                 108.411395.38
                                        111.0111405.21
                                                                                                                    108.24
11447.83 107.3211474.05
11611.71 11011654.33
11772.33 111.5411782.16
11847.71 118.5411896.88
                                        107.9811519.94
109.5111696.94
113.7311791.99
117.8511916.55
                                                                 108.2211555.99
                                                                 118.0511801.83
                                                                                           117.1811811.66
                                                                 111.5711932.94 101.1611942.77
 11952.6
                 95.3711959.16
                                          91.8711965.71
                                                                   90.52 12129.6
                                                                                            90.5212139.44
                                                                 116.7612198.44
127.9912263.99
                                        116.0712191.88
12214.83
               130.9712224.66
                                         131.612241.05
                                                                                          119.7412293.49
                                                                                                                    114.57
12303.33 110.4612313.16 109.3812322.99 105.39 12336.1 105.1512345.94 109.11 12352.49 110.5512385.27 112.0412401.66 111.7612421.33 110.0812444.27 109.76
Manning's n Values num=
Sta n Val Sta n Val Sta
118 8572.85 .066 9527.05
                                                                  n Val Sta
.015 9726.99
                                                                                           n Val Sta
                        Right Lengths: Left Channel Right
9785.99 203.14 3680.24 4630.8
Station= 56.73 Elevation= 122.4
Station=11847.71 Elevation= 118.55
Bank Sta: Left Right 9300.88 9785.99
                                                                                              Coeff Contr.
Left Levee
Right Levee
                                                                            122.43
118.54
| Sta L | Sta R | Elev | Sta L | Sta R | Elev | 24.1 | 9293.17 | 108.72 | 9791.1711767.07 | 107.97
CROSS SECTION OUTPUT Profile #Design Flow
                                           116.47
                                                           Element
                                                                                                    Left OB
                                                                                                                    Channel
                                                                                                                                     Right OB
                                                           Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                          0.15
116.33
                                                                                                    0.112
                                                                                                                       0 049
                                                                                                                  13143.96
                                             99.68
                                                                                                 69585.13
                                                                                                                                    16066.75
                                                           Area (sq ft)
                                        0.000275
                                                                                                                  13143.96
   E.G. Slope (ft/ft)
                                                                                                                                    16066.75
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                        130000.00
                                                           Flow (cfs)
                                                                                                  59042.58
                                                                                                                 58886.47
                                                                                                                                     12070.94
                                                          Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                        11709.46
                                                                                                                     485.11
                                                                                                                                      2002.08
                                                                                                   0.85
                                                                                                                        4.48
                                                                                                                                          0.75
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                             45 05
                                                                                                                      27.09
                                                                                                       7 55
                                                                                                                                          8 03
                                        7840448.0
                                                                                                                     3551510.0
                                         1820.58
                                                                                                   9225.16
                                                                                                                     498.93
                                                                                                                                     2005.14
                                                           Shear (lb/sq ft)
Stream Power (lb/ft s)
         Ch El (ft)
                                             71.28
                                                                                                                      0.45
                                               5.47
                                                                                                       0.11
   Alpha
                                                                                                                         2.03
                                                                                                                                          0.10
                                                                                                                    62914.38
   Frctn Loss (ft)
                                                           Cum Volume (acre-ft)
                                                                                                 169654.20
                                                                                                                                     204926
                                                                                                                                   24571.55
   C & E Loss (ft)
                                                                                                 21355.02
                                               0.03
                                                           Cum SA (acres)
                                                                                                                    2633.23
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.
              Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used
Note:
CROSS SECTION
RIVER: Rio Grande
                                        RS: 165
REACH: Lower Reach
Description: New Cross-Section, Bathymetric elevations translated from New
                   Cross-Section 166
Station Elevation Data
                                        num=
                                                      460
  Sta Elev Sta
0 102.72 12.82
119.74 112.99 139.42
287.04 103.12 359.21
                                        Elev Sta Elev
103.78 41.68 113.61
106.59 172.23 98.76
102.92 405.14 103.12
                                                                113.61 70.53 122.41 86.94 122.51 98.76 191.91 103.4 218.15 102.83 103.12 418.26 103.65 464.19 103.07
   572.44
               103.48
103.84
                           667.57
890.64
                                        103.57
                                                    680.69
920.16
                                                                104.22
103.7
                                                                             693.81
                                                                                          103.26 716.78
103.93 1077.62
                                         104.53
                                                                              995.61
 1120.27
1320.37
               104.22 1215.4
105.05 1363.02
                                        103.88 1267.89
104.27 1408.94
                                                                 104.45 1277.73
104.66 1441.75
                                                                                          104.92 1307.25
104.03 1461.43
                                                                                                                    104 12
                                        104.56
                                                                  104.05 1559.84
 1474.55
                103.99
                           1500.8
                                                   1533.6
                                                                                           104.85 1576.24
               104.3 1661.54
104.41 1943.65
                                        105.03 1677.94
104.17 1960.05
                                                                  104.34 1727.14
104.75 1992.86
  1641.85
                                                                                           104.29 1812.43
  1861.64
                                                                                           104.24 2019.1
 2065.03
2212.65
               103.77 2078.15
103.91 2261.86
                                        104.21 2133.92
103.97 2330.75
                                                                  103.69
                                                                            2153.6
2406.2
                                                                                          104.29 2186.41
104.38 2465.25
                                                                  105.09 2570.23
 2471.81
                103.41 2534.14
                                        103.73 2543.98
                                                                                           103.52 2685.05
                                                                                                                     103.6
                104.03 2783.46
                                         104.11 2793.3
                                                                  103.65 2816.27
                                                                                           104.51 2835.95
 2855.63
                103.39 2885.16
                                        104.29 2901.56
                                                                  103.63 2944.21
                                                                                           103.36 2957.33
                103.72 3006.54
106.29 3167.28
                                        104.56 3052.46
106.93 3183.69
                                                                 104.54 3078.71
106.44 3236.17
   3131.2
                                                                                           106.12 3268.98
```

3305.07 3570.79

3767.62

3997 26

4236.73

4463.07

106.01 3364.11 106.3 3587.19

106.26 3780.74 106.36 3908.68 106.75 4023.5 104.23 4154.72 102.23 4269.53

108.36 4361.38 108.17 4492.59

105.24 4604.12

106.34 3377.24 107.42 3600.31

106.56 3836.51 102.53 3954.61

107.91 4053.03 105.02 4164.56

105.2 4272.81 105.9 4377.78 106.25 4505.71

104.36 4659.88 104.6 4735.33 105.9 3455.97 106.47 3652.8

106.06 3852.91 103.48 3967.73

107.46 4079.27

107.46 4079.27 104.09 4190.8 104.43 4302.33 107.21 4400.74 106.7 4541.79

104.99 4669.72

106.29 3482.21 106.43 3685.61

106.61 3879.16 105.39 3980.85

105.36 4118.63

104.34 4203.92 105.67 4325.29

106.25 4426.98 106.04 4564.75

103.19 4679.56

105 76

102.91 4820.62

102.91 4837.02 103.97 4850.14

```
103.18 4964.95 103.23 4974.79
105.22 5030.56 103.1 5060.08
 4879.66
4994.47
                 101.74 4905.9
                                            101.58 4919.03
                                                                                                                               102.06
                                            100.94 5142.09
102.97 5332.34
103.79 5440.59
                                                                                                   100.93 5247.06
105.79 5361.87
 5086.32
                  105.1
                                  5106
                                                                        100.58 5224.09
                                                                                                                               105.03
                102.02 5312.66
   5289.7
                                                                        105.19 5352.02
 5391.39
                 103.24 5427.47
                                                                        103.38
                                                                                    5506.2
                                                                                                    104.72 5565.24
                 104.2 5601.33
105.78 5716.14
                                            105.61 5627.57
104.86 5732.54
                                                                       104.99 5663.65
105.68 5758.78
                                                                                                   107.07 5676.77
105.5 5788.3
 5703.02
                                            107.67 5883.43
103.2 6024.48
                                                                                                   104.38 5912.95
103.55 6139.29
 5824.39
                 105.28 5857.19
103.82 5991.68
                                                                        106.65 5896.55
                                           103.72 6313.15
104.2 6582.13
103.51 6956.09
103.42 7126.66
105 7241.47
                                                                        103.33 6401.72
 6165.54
                 103.56 6227.86
                                                                                                    103.61 6450.92
                103.56 6227.86
103.67 6562.45
103.7 6821.6
105.72 7113.54
                                                                       103.4 6683.82
103.77 6988.89
                                                                                                   103.31 6706.79
104.25 7005.29
 6729.75
                                                                       103.77 6988.89
104.14 7146.34
105.46 7287.4
105.04 7451.41
106.19 7582.62
104.66 7825.37
108.47 8035.3
                                                                                                   103.52 7166.03
104.29 7297.24
  7074.18
  7205.39
                 103.93 7215.23
                                           105 7241.47
103.84 7382.53
105.44 7546.54
105.7 7763.04
105.71 7963.14
107.9 8228.84
                104.98 7353
105.79 7530.14
104.36 7730.24
104.55 7910.65
108.38 8173.08
 7333.32
                                                                                                   105.56 7471.09
104.75 7615.43
                                                                                                        104 7851.61
 7697.43
                                                                                                   108.73 8058.27
108.67 8271.48
 8153.39
                                                                        108.06 8235.4
 8307.57
8520.79
                109.04 8323.97
109.35 8540.47
                                            108.17 8376.45
108.45 8560.15
                                                                       108.03 8402.7
111.79 8592.95
                                                                                                   108.5 8435.5
113.51 8619.19
                                           108.45 8560.15
106.34 8678.24
103.84 8884.9
103.84 9157.19
104.32 9485.28
104.16 10013.5
                110.05 8655.28
104.38 8848.81
                                                                        104.15 8707.76
104.43 8943.94
                                                                                                   104.42 8724.16
103.61 9035.79
 8638.88
                104.48 8848.81
104.08 9121.1
104.49 9475.43
104.46 9977.41
104.110187.39
103.7810387.52
102.4310541.72
                                                                       104.34 9167.03
105.12 9537.77
103.94 10066
                                                                                                   103.99 9354.04
104.59 9613.23
 9075.17
   9721.5
                                                                                                  104.1710098.81
                                           104.410213.64
104.5310420.33
101.7510561.41
102.4610702.49
                                                                       103.9410246.45
108.87 10443.3
10161.14
                                                                                                   104.210315.34
104.6610456.42
10357.99
                                                                       103.1410600.78
101.6710732.02
10502 35
                                                                                                    102.8310633.59
10653.27
                                                                                                    102.1110748.42
                                                                       102.0310863.25
108.3111017.46
10784.51
                102.3810814.04
                                              104.110840.29
                                                                                                    104.2310925.59
                                                                                                   104.56 11027.3
103.92 11112.6
                  102.211063.39
                                           102.911079.79
101.3211168.38
98.8111302.89
 11043.7
                                                                       101.44 11096.2
                                                                                                                                 100.4
11122.44
                100.0611142.13
100.3711273.37
                                                                       98.9111191.34
92.1411322.58
77.3111392.67
85.8211525.99
                                                                                                    98.2711217.59
90.1611338.98
71.7711432.67
97.5411532.56
                  85.2711358.67
70.7711493.18
                                              83.3811365.67
85.2711499.75
                                                                                                                                 70 77
11352 11
11462.67
                                            108.5911598.17
11555.52
                108.8411568.65
                                                                      106.6811617.86
                                                                                                   106.6311660.51
                                                                                                                               105.58
                                            107.9711788.41 108.5611827.76
108.17 11932.7 107.1411985.17
108.0512116.34 107.4712195.04
107.2212329.49 103.5612336.04
11883.51
                 108.0111919.58
                                                                                                     107.212004.84
                107.2312096.66
107.0512309.81
                                                                                                   107.3812214.71
101.2712365.56
12024.52
12231.11
                                           95.8112447.54
96.2812614.78
107.2112713.16
107.4912860.73
                  96.912418.03
98.5612601.67
                                                                       95.1212513.12
96.8212631.18
                                                                                                    94.78 12549.2
100.412637.74
12401.63
                107.8212670.53
107.7612837.77
                                                                                                  105.2112736.11
106.6512942.71
12660.69
                                                                      106.8812726.28
                                                                                                                               107.37
                                                                        106.6712903.36
                106.27 12975.5
107.07 13165.7
104.813293.59
                                           105.8313044.36
107.1713182.09
105.45 13323.1
12952.54
13132.9
                                                                       106.0413086.99
                                                                                                    105.613119.79
                                                                                                                               106.07
                                                                       106.1213195.21
104.3713382.12
13273.91
                                                                                                    105.1213395.24 106.29
13428.03 104.813293.59
13428.03 104.9913454.27
13631.35 103.6313677.26
13755.96 103.4513775.63
13962.55 109.3414044.53
14218.33 108.2614228.17
                                           105.45 13323.1
105.2713506.74
104.4613710.05
105.1213795.31
107.7914054.37
11014244.57
                                                                                                   103.19 13575.6 104.6
103.6113746.12 104.37
107.7713933.04 108.22
                                                                       104.4413536.25
104.2713726.45
                                                                       104.4813854.34
107.2814172.42
109.18 14254.4
                                                                                                                               108.96
                                                                                                    109.8314303.59
                10714346.22
107.3614516.74
                                                                       106.6914418.37
                                              106.514408.53
                                                                                                    106.3514454.44
14329.83
                                           106.9214556.09
111.0914700.38
111.0114831.55
14500.35
                                                                                                    108.8314651.19
                                                                                                                               110.26
14670.87
                109.3714687.26
108.47 14808.6
                                                                      108.1214726.62
110.5814851.23
                                                                                                   108.114759.41
111.1814897.14
 14792.2
14906 97
                 110.5414949.61
                                            111 3814972 56
                                                                         113 115002 07
                                                                                                    113.99 15044.7
                                                                                                                               113 48
                 114.6315080.77
                                            114.3115103.73

    15185.71
    119.3515205.39
    118.13
    15234.9
    117.5715254.57
    113.8615264.41
    109.98

    15274.25
    101.9415287.37
    94.8915310.32
    90.2615480.84
    90.26
    15487.4
    92.71

    15510.35
    107.8615516.91
    109.0215536.59
    108.3815579.22
    109.5715585.78
    110.53

Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .11810541.72 .06611352.11 .01511493.18
                                                                                                   n Val
                                                                                                      .06611788.41
                                                                                                                                  .132
                                  ht Lengths: Left Channel Right
52 200.92 3697.62 2252.28
num= 2
Bank Sta: Left Right 11237.2811555.52
                                                                                                      Coeff Contr.
Ineffective Flow num= 20
Sta L Sta R Elev Permanent 011237.28 108.37 T 11555.5215585.78 108.84 T
                                                            Elevation= 122.51
Elevation= 119.68
Left Levee Station=
                                              86 94
                           Station=15146.36
Blocked Obstructions num=
   Sta L Sta R Elev
139.42 3078.71 106.83
CROSS SECTION OUTPUT Profile #Design Flow
                                                                 Element
                                                                                                                                Channel
                                                                Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                  0.05
                                                                                                               0.110
                                                                                                                                  0.047
                                              116.07
107.37
                                                                                                                               3697.62
9587.31
                                                                                                              200.92
                                                                                                                                                  2252.28
                                                                                                          118978.70
                                                                                                                                                   24383.74
                                    0.000124
130000.00
   E.G. Slope (ft/ft)
Q Total (cfs)
                                                                Area (sq ft)
Flow (cfs)
                                                                                                          119111.60
                                                                                                                                 9587.31
                                                                                                                                                   33957.08
                                            130000.00
                                                                Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
   Top Width (ft)
Vel Total (ft/s)
                                           15020.63
                                                                                                          11128.17
                                                                                                                                318.24
                                                                                                                                                   3574.22
                                                   0.85
                                                                                                                 0.73
                                                                                                                                     3.31
                                                                                                               10.69
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                  45.30
                                                                                                                                  30.13
                                                                                                                                                        6.82
                                            11683000.0
                                                                                                              7775714.0
                                                                                                                                  2852241.0
                                                                                                                          331.06
                                                                                                          11141.38
                                                                                                                                                  3580.63
                                             1482.44
         Ch El (ft)
                                                  70.77
                                                                 Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                 0.08
                                                                                                                                 0.22
                                                                                                                                                       0.05
   Alpha
  Frctn Loss (ft)
C & E Loss (ft)
                                                                                                         169214.30
                                                   0.17
                                                                 Cum Volume (acre-ft)
                                                                                                                               61954.13
                                                                                                                                                 202267.20
                                                                                                          21307.57
                                                                                                                               2599.29
                                                                Cum SA (acres)
               Manning's n values were composited to a single value in the main channel.
Note:
               Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
REACH: Lower Reach
                                            RS: 163
Description: New Cross-Section, Bathymetric elevations translated from New Cross-Section 165
```

| 61 -1 1 B | na di la mata | 460 | | | |
|--|--|---|---|---|---|
| Sta | levation Data
Elev Sta | num= 460
Elev Sta | Elev Sta | Elev Sta | Elev |
| 0 | 99.57 22.29 | 103.27 38.21 | 105.17 63.68 | 113.19 86.06 | 121.17 |
| 92.62 | 122.46 105.74 | 122.54 112.3 | 121.44 145.1 | 110.79 161.5 | 106.14 |
| 171.34 | 105.03 187.74 | 98.83 194.3 | 98.76 207.42 | 103.23 279.58 | 103.25 |
| 289.42 | 102.83 315.66 | 103.02 371.42 | 102.89 489.5 | 102.98 587.91 | 103.37 |
| 623.99 | 103.13 660.07 | 103.38 699.43 | 104.05 709.27 | 103.6 758.47 | 104.25 |
| 797.83 | 103.68 807.67 | 104.06 886.39 | 104.19 945.43 | 104.88 968.39 | 104.07 |
| 978.23 | 99.37 984.79 | 98.57 994.63 | 100.59 1017.59 | 99.5 1040.55 | 103.77 |
| 1053.67 | 98.78 1063.51 | 99.43 1079.91 | 94.69 1102.87 | 93.58 1119.27 | 90.76 |
| 1125.83 | 88.24 1138.95 | 87.22 1145.51 | 88.35 1158.63 | 93.81 1171.75 | 93.12 |
| 1184.87 | 89.39 1214.39 | 85.37 1234.07 | 84.36 1247.19 | 82.45 1260.31 | 82.06 |
| 2657.59 | 82.06 2690.39 | 83.8 2700.23 | 84.98 2723.19 | 89.02 2739.59 | 92.73 |
| 2752.71 | 93.82 2769.11 | 94.22 2782.23 | 96.93 2788.78 | 99.75 2795.34 | 99.24 |
| 2828.14 | 106.08 2851.1 | 105.4 2870.78 | 106.03 2893.74 | 105.72 2916.7 | 106.35 |
| 2959.34 | 105.72 2992.14 | 104.48 3011.82 | 104.76 3024.94 | 104.09 3051.18 | 104.49 |
| 3077.42 | 106.72 3120.06 | 106.67 3136.46 | 106.15 3182.38 | 106.53 3205.34 | 106.09 |
| 3257.82 | 106.65 3287.34 | 105.99 3313.58 | 106.66 3372.62 | 106.04 3421.81 | 106.42 |
| 3480.85 | 106.51 3510.37 | 106.8 3533.33 | 106.35 3559.57 | 106.57 3703.89 | 103.31 |
| 3756.37 | 102.79 3831.81 | 102.78 3858.05 | 103.16 3890.85 | 102.55 3913.81 | 103.64 |
| 3926.93 | 102.17 3940.05 | 103.03 3972.85 | 101.66 4022.04 | 101.26 4071.24 | 101.53 |
| 4110.6 | 101.11 4163.09
101.37 4445.17 | 101.33 4172.93
101.22 4520.62 | 100.99 4264.77
101.68 4559.98 | 101.22 4310.69 | 101.01 |
| 4386.13
4599.34 | 105.74 4612.46 | 105.31 4622.3 | 102.83 4655.1 | 102.45 4589.5
103.5 4678.06 | 104.13
103.19 |
| 4687.9 | 104.41 4720.7 | 102.7 4799.43 | 103 4812.55 | 105.19 4828.95 | 104.75 |
| 4838.79 | 105.35 4861.75 | 105.36 4868.31 | 103.15 4901.11 | 102.89 4917.51 | 102.04 |
| 4969.99 | 101 5035.59 | 101.61 5058.55 | 102.48 5091.36 | 101.85 5117.6 | 102.49 |
| 5137.28 | 101.99 5183.2 | 102.81 5222.56 | 102.34 5242.24 | 103.1 5265.2 | 102.58 |
| 5278.32 | 103.41 5301.28 | 106.01 5320.96 | 104.46 5340.64 | 104.53 5363.6 | 105.89 |
| 5396.41 | 104.87 5432.49 | 105.95 5448.89 | 106.97 5478.41 | 105.76 5517.77 | 104.65 |
| 5527.61 | 105.39 5547.29 | 104.77 5566.97 | 106.2 5580.09 | 105.93 5596.49 | 107.05 |
| 5622.73 | 105.91 5652.25 | 106.22 5662.09 | 105.42 5685.05 | 105.47 5708.02 | 106.65 |
| 5717.86 | 106.02 5763.78 | 106.93 5796.58 | 106.23 5812.98 | 104.93 5858.9 | 108.4 |
| 5878.58 | 108.06 5898.26 | 106.66 5908.1 | 104.75 5944.18 | 103.38 6009.79 | 103.3 |
| 6068.83 | 103.63 6104.91 | 103.34 6213.15 | 103.42 6239.39 | 103.28 6282.03 | 103.58 |
| 6331.24 | 103.59 6370.6 | 103.29 6446.04 | 103.38 6462.44 | 103.8 6501.8 | 103.26 |
| 6541.16 | 103.56 6626.45 | 103.62 6675.65 | 103.48 6688.77 | 103.77 6741.25 | 103.38 |
| 6833.09 | 103.53 6898.69 | 103.93 6938.06 | 103.52 6964.3 | 104.23 6970.86 | 103.6 |
| 7016.78 | 103.28 7046.3 | 103.97 7088.94 | 103.51 7111.9 | 104.37 7141.42 | 103.57 |
| 7147.98 | 104.29 7174.22 | 104.41 7197.18 | 103.67 7243.11 | 104.08 7295.59 | 103.86 |
| 7341.51 | 105.53 7357.91 | 103.58 7371.03 | 105.14 7397.27 | 104.81 7416.95 | 93.19 |
| 7439.91 | 86.34 7456.31 | 82.87 7463.31 | 76.8 7490.31 | 71.26 7510.31 | 70.56 |
| 7520.31 | 71.26 7530.31 | 70.26 7560.31 | 70.26 7590.82 | 84.76 7633.43 | 84.65 |
| 7649.83 | 85.46 7672.79 | 87.75 7689.19 | 91.25 7695.75 | 93.71 7721.99 | 97.37 |
| 7741.67 | 95.93 7761.35 | 98.31 7800.71 | 98.65 7830.23 | 98.05 7849.91 | 96.6 |
| 7863.03 | 97.95 7882.71 | 97.04 7895.83 | 98.34 7931.91 | 98.01 7941.75 | 97.14 |
| 7958.15 | 97.69 7974.55 | 95.61 7987.67 | 94.95 8017.19 | 96.11 8043.43 | 94.78 |
| 8086.07 | 98.03 8102.47 | 98.55 8109.03 | 97.97 8194.32 | 98.07 8207.44 | 97.05 |
| 8223.84 | 96.82 8256.64 | 94.52 8276.32 | 94.84 8292.72 | 96.88 8318.97 | 98.55 |
| 8332.09 | 101.27 8345.21 | 101.17 8361.61 | 98.64 8371.45 | 98.31 8423.93 | 98.87 |
| 8460.02 | 97.55 8505.94 | 96.69 8525.62 | 96.64 8558.43 | 97.38 8568.27 | 98.63 |
| 8610.91 | 100.89 8624.03 | 104.29 8643.71 | 105.17 8669.96 | 100.79 8706.04 | 100.81 |
| 8729 | 100.23 8758.52 | 100.6 8778.2 | 101.57 8801.17 | 105.5 8814.29 | 105.62 |
| 8827.41 | 107.42 8853.65 | 106.04 8896.29 | 107.74 8929.1 | 107.63 8988.14 | 108.19 |
| 9043.91 | 107.96 9112.79 | 105.7 9181.68 | 106.38 9217.76 | 107.03 9237.44 | 106.53 |
| 9306.33 | 106.61 9339.13 | 106.09 9368.65 | 106.61 9440.82 | 107.38 9522.83 | 106.22 |
| 9542.51 | 105.69 9588.43 | 105.98 9644.2 | 107.02 9663.88 | 108.12 9670.44 | 107.53 |
| 9703.24 | 107.44 9713.08 | 106.88 9772.13 | 106.48 9877.1 | 107.19 9886.93 | 106.77 |
| 9965.61
10100.02 | 106.78 9985.28 | 107.7610001.67 | 107.1410077.08 | 108.4810083.63 | 108.98
106.73 |
| 10322.95 | 108.0810145.92
106.3810336.06 | 107.8210152.48
104.3510349.18 | 107.1810260.66
106.1410359.01 | 106.3710303.28
105.3110365.57 | 103.16 |
| 10378.68 | 102.1910401.63 | 102.05 10421.3 | 102.5110437.69 | 106.5710483.59 | 106.51 |
| 10519.65 | 106.7710545.88 | 107.3410568.82 | 106.6410585.21 | 108.2710614.72 | 109.49 |
| 10650.78 | 109.0210660.62 | 105.8410673.73 | 10310690.12 | 100.7510726.18 | 101.24 |
| 10752.41 | 103.3510765.52 | 98.510775.36 | 97.4210791.75 | 101.23 10844.2 | 100.43 |
| 10867.15 | 102.2610899.93 | 101.33 10936 | 10110945.83 | 99.110981.89 | 99.29 |
| 11017.95 | 99.0611024.51 | 99.6511044.18 | 105.4211103.19 | 105.9411145.81 | 107.12 |
| 11191.7 | 107.4711290.05 | 107.211342.51 | 107.5511414.63 | 108.5611424.46 | 107.99 |
| 11460.53 | 107.9311483.47 | 106.7111522.81 | 106.7611535.93 | 106.4211598.22 | 106.9 |
| 11634.28 | 10611657.23 | 103.811749.02 | 104.5611778.52 | 105.0111808.03 | 104.87 |
| 11827.7 | 103.9911886.71 | 103.511899.82 | 103.9511955.55 | 104.7511965.39 | 105.61 |
| 11985.06 | 108.7412014.56 | 107.21 12053.9 | 108.7312067.02 | 109.7312080.13 | 108.95 |
| 12103.08 | 108.7212119.47 | 107.8312148.97 | 108.5712165.37 | 107.7812191.59 | 107.56 |
| 12204.71 | 108.08 12221.1 | 107.6912247.32 | 108.2512273.55 | 107.69 12326 | 107.31 |
| 12365.34 | 105.79 12371.9 | 106.9312388.29 | 106.1512407.96 | 107.2312430.91 | 106.46 |
| 12444.02 | 107.0512503.03 | 107.1412516.15 | 107.5312529.26 | 106.7912535.82 | 101.71 |
| 12542.37 | 99.2212555.49 | 101.512562.04 | 101.0112571.88 | 103.8612591.55 | 98.75 |
| 12607.94 | 97.9612624.33 | 98.6512657.11 | 97.8912666.95 | 99.1412680.06 | 107.07 |
| 12725.96 | 106.812742.35 | 107.1 12765.3 | 106.2212811.19 | 106.6712821.03 | 106.34 |
| 12896.43 | 105.8112922.66 | 106.1112935.77 | 105.4412978.39 | 105.8813001.34 | 105.54 |
| 13037.4 | 105.9613053.79 | 105.61 13066.9 | 106.1513125.91 | 105.69 13158.7 | 106.43 |
| 13198.04 | 105.713211.15 | 105.9913230.82 | 107.413243.93 | 105.5413289.83 | 104.6 |
| 13322.61 | | 103.5813365.23 | 103.7313381.62 | 105.0413394.74 | 104.12 |
| | 104.9513345.56 | | | | |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13489.81 | 103.6813512.75 | 103.2213522.59 | 103.9213561.93 | 103.713604.55 | 104.36 |
| 13620.94 | 103.7313634.05 | 104.6213643.89 | 103.6913653.72 | 104.4613686.51 | 103.89 |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13489.81 | 103.6813512.75 | 103.2213522.59 | 103.9213561.93 | 103.713604.55 | 104.36 |
| 13620.94 | 103.7313634.05 | 104.6213643.89 | 103.6913653.72 | 104.4613686.51 | 103.89 |
| 13702.9 | 102.5113716.01 | 103.7813725.85 | 103.1113748.79 | 103.4213788.13 | 103.04 |
| 13797.97 | 103.8813843.87 | 104.2413866.81 | 103.0213915.99 | 104.7213965.16 | 104.26 |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13489.81 | 103.6813512.75 | 103.2213522.59 | 103.9213561.93 | 103.713604.55 | 104.36 |
| 13620.94 | 103.7313634.05 | 104.6213643.89 | 103.6913653.72 | 104.4613686.51 | 103.89 |
| 13702.9 | 102.5113716.01 | 103.7813725.85 | 103.1113748.79 | 103.4213788.13 | 103.04 |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13489.81 | 103.6813512.75 | 103.2213522.59 | 103.9213561.93 | 103.713604.55 | 104.36 |
| 13620.94 | 103.7313634.05 | 104.6213643.89 | 103.6913653.72 | 104.4613686.51 | 103.89 |
| 13702.9 | 102.5113716.01 | 103.7813725.85 | 103.1113748.79 | 103.4213788.13 | 103.04 |
| 13797.97 | 103.8813843.87 | 104.2413866.81 | 103.0213915.99 | 104.7213965.16 | 104.26 |
| 13978.28 | 104.8113994.67 | 103.6514011.06 | 103.6714034.01 | 104.57 14050.4 | 104.09 |
| 14096.3 | 105.09 14125.8 | 106.9414155.31 | 106.1814161.86 | 105.04 14171.7 | 106.21 |
| 14207.76 | 105.5614220.87 | 106.2814266.77 | 106.3514286.44 | 107.74 14293 | 107.08 |
| 13404.57 | 99.9113417.68 | 103.4313443.91 | 103.8813453.75 | 103.2213479.97 | 102.99 |
| 13489.81 | 103.6813512.75 | 103.221352.59 | 103.9213561.93 | 103.713604.55 | 104.36 |
| 13620.94 | 103.7313634.05 | 104.6213643.89 | 103.6913653.72 | 104.4613686.51 | 103.89 |
| 13702.9 | 102.5113716.01 | 103.7813725.85 | 103.1113748.79 | 103.4213788.13 | 103.04 |
| 13797.97 | 103.8813843.87 | 104.2413866.81 | 103.0213915.99 | 104.7213965.16 | 104.26 |
| 13978.28 | 104.8113994.67 | 103.6514011.06 | 103.6714034.01 | 104.57 14050.4 | 104.09 |
| 14096.3 | 105.09 14125.8 | 106.9414155.31 | 106.1814161.86 | 105.04 14171.7 | 106.21 |
| 14207.76 | 105.5614220.87 | 106.2814266.77 | 106.3514286.44 | 107.74 14293 | 107.08 |
| 14315.94 | 107.1314325.78 | 102.1414335.61 | 106.4214345.45 | 107.6914355.28 | 107.41 |
| 14378.23 | 108.5314401.18 | 108.3914417.57 | 113.414424.13 | 114.3414450.35 | 114.08 |
| 13404.57
13489.81
13620.94
137702.9
13797.97
13978.28
14096.3
14207.76
14315.94
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| 13404.57
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104.7213965.16
104.57 14050.4
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n Val Sta | 102.99
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| 13404.57 13489.81 13620.94 137702.9 13797.97 13978.28 14096.3 14207.76 14315.94 14378.23 14460.19 Manning's Sta 0 12067.02 Bank Sta: 73 Ineffecti Sta L | 99.9113417.68 103.6813512.75 103.7313634.05 102.5113716.01 103.8813843.87 104.8113994.67 105.09 14125.8 105.5614220.87 107.1314325.78 108.53134401.18 113.4914479.86 sn Values n Val Sta .066 105.74 .06 Left Right 197.27 7800.71 Ve Flow num= Sta R Elev | 103.4313443.91 103.2213522.59 104.6213643.89 103.7813725.85 104.2413866.81 103.6514011.06 106.9414155.31 106.2814266.77 102.1414335.61 108.3914417.57 109.6414489.69 num= 6 n Val Sta .12 7463.31 Lengths: Left C 2552.46 4 2 Permanent | 103.8813453.75
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n Val Sta
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thannel Right | 103.2213479.97 103.713604.55 104.4613686.51 103.4213788.13 104.7213965.16 104.57 14050.4 105.04 14171.7 107.74 14293 107.6914355.28 114.3414450.35 109.1314535.59 n Val Sta.12 8332.09 Coeff Contr. | 102.99
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n Val
.085 |
| 13404.57 13489.81 13620.94 137702.99 13978.28 14096.3 14207.76 14315.94 14378.23 14460.19 Manning's Sta 0 12067.02 Bank Sta: 73 Ineffecti Sta L 0 | 99.9113417.68 103.6813512.75 103.7313634.05 102.5113716.01 103.8813843.87 104.8113994.67 105.09 14125.8 105.5614220.87 107.1314325.78 108.5314401.18 113.4914479.86 8 n Values n Val .066 105.74 .06 Left Right 197.27 7800.71 .ve Flow num= Sta R Elev 7397.27 104.81 | 103.4313443.91 103.2213522.59 104.6213643.89 103.7813725.85 104.2413866.81 103.6514011.06 106.9414155.31 106.2814266.77 102.1414335.61 108.3914417.57 109.6414489.69 num= 6 n Val Sta .12 7463.31 Lengths: Left C 2552.46 4 2 Permanent T | 103.8813453.75
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103.6913653.72
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103.0213915.99
103.6714034.01
106.1814161.86
106.3514286.44
106.4214345.45
113.414424.13
110.1214496.25
n Val Sta
.025 7649.83
thannel Right | 103.2213479.97 103.713604.55 104.4613686.51 103.4213788.13 104.7213965.16 104.57 14050.4 105.04 14171.7 107.74 14293 107.6914355.28 114.3414450.35 109.1314535.59 n Val Sta.12 8332.09 Coeff Contr. | 102.99
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104.26
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106.21
107.08
107.41
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n Val
.085 |
| 13404.57 13489.81 13620.94 137702.9 13797.97 13978.28 14096.3 14207.76 14315.94 14378.23 14460.19 Manning's Sta 0 12067.02 Bank Sta: 73 Ineffecti Sta L 0 7800.711 Left Leve | 99.9113417.68 103.6813512.75 103.7313634.05 102.5113716.01 103.8813843.87 104.8113994.67 105.09 14125.8 105.5614220.87 107.1314325.78 108.5314401.18 113.4914479.86 8 n Values n Val Sta .066 105.74 .06 Left Right 197.27 7800.71 .ve Flow num= Sta R Elev 7397.27 104.81 .4535.59 98.65 | 103.4313443.91 103.2213522.59 104.6213643.89 103.7813725.85 104.2413866.81 103.6514011.06 106.9414155.31 106.2814266.77 102.1414335.61 108.3914417.57 109.6414489.69 num= 6 n Val Sta .12 7463.31 Lengths: Left C 2552.46 4 2 Permanent T T 105.74 Ele | 103.8813453.75 103.9213561.93 103.6913653.72 103.1113748.79 103.0213915.99 103.6714034.01 106.1814161.86 106.3514286.44 106.4214345.45 113.414424.13 110.1214496.25 n Val Sta .025 7649.83 thannel Right 131.21 2270.67 vation= 122.54 | 103.2213479.97 103.713604.55 104.4613686.51 103.4213788.13 104.7213965.16 104.57 14050.4 105.04 14171.7 107.74 14293 107.6914355.28 114.3414450.35 109.1314535.59 n Val Sta.12 8332.09 Coeff Contr. | 102.99
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n Val
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Left Leve Right Leve Blocked 0 | 99.9113417.68 103.6813512.75 103.7313634.05 102.5113716.01 103.8813843.87 104.8113994.67 105.09 14125.8 105.5614220.87 107.1314325.78 108.5314401.18 113.4914479.86 sn Values n Val Sta .066 105.74 .06 Left Right 197.27 7800.71 19.09 Nummer Sta R Elev 73ta R Elev 73ta R Elev 73ta R Elev 73ta R Station= 1055tructions | 103.4313443.91 103.2213522.59 104.6213643.89 103.7813725.85 104.2413866.81 103.6514011.06 106.9414155.31 106.2814266.77 102.1414335.61 108.3914417.57 109.6414489.69 num= 6 n Val Sta .12 7463.31 Lengths: Left C 2552.46 4 2 Permanent T 105.74 Ele 4424.13 Ele num= 2 | 103.8813453.75 103.9213561.93 103.6913653.72 103.1113748.79 103.0213915.99 103.6714034.01 106.1814161.86 106.3514286.44 106.4214345.45 113.414424.13 110.1214496.25 n Val Sta .025 7649.83 channel Right 131.21 2270.67 | 103.2213479.97 103.713604.55 104.4613686.51 103.4213788.13 104.7213965.16 104.57 14050.4 105.04 14171.7 107.74 14293 107.6914355.28 114.3414450.35 109.1314535.59 n Val Sta.12 8332.09 Coeff Contr. | 102.99
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107.41
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n Val
.085 |
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103.89
103.04
104.26
104.09
106.21
107.08
107.41
114.08
108.72
n Val
.085 |

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 115.95 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|--------------|
| Vel Head (ft) | 0.02 | Wt. n-Val. | 0.120 | 0.084 | 0.080 |
| W.S. Elev (ft) | 115.93 | Reach Len. (ft) | 2552.46 | 4131.21 | 2270.67 |
| Crit W.S. (ft) | 102.35 | Flow Area (sq ft) | 78579.47 | 12245.05 | 67719.81 |
| E.G. Slope (ft/ft) | 0.000103 | Area (sq ft) | 85626.80 | 12245.05 | 68756.53 |
| Q Total (cfs) | 130000.00 | Flow (cfs) | 48169.51 | 20944.93 | 60885.57 |
| Top Width (ft) | 14406.32 | Top Width (ft) | 7268.00 | 403.44 | 6734.88 |
| Vel Total (ft/s) | 0.82 | Avg. Vel. (ft/s) | 0.61 | 1.71 | 0.90 |
| Max Chl Dpth (ft) | 45.67 | Hydr. Depth (ft) | 10.81 | 30.35 | 10.06 |
| Conv. Total (cfs) | 12831780.0 | Conv. (cfs) | 4754619.0 | 2067390 | .0 6009770.0 |
| Length Wtd. (ft) | 2702.40 | Wetted Per. (ft) | 7274.79 | 415.56 | 6748.42 |
| Min Ch El (ft) | 70.26 | Shear (lb/sq ft) | 0.07 | 0.19 | 0.06 |
| Alpha | 1.47 | Stream Power (lb/ft s) | 0.04 | 0.32 | 0.06 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 168742.10 | 61027.50 | 199611.80 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 21265.14 | 2568.66 | 24008.63 |
| | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 162.1

INPUT

Description: Extended block obstruction, Bathymetric elevations translated from

| | IBWO | 2008 Cr | oss-sect | | | | | | |
|--------------------|-----------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|--------------------|------------------|
| Station E | | | num= | 460 | | | | | , |
| Sta
0 | Elev | Sta
19.67 | Elev
122.78 | Sta
62.3 | Elev
111.77 | Sta
78.7 | Elev
106.85 | Sta
98.37 | Elev
103.8 |
| 114.77 | 122.38
98.23 | 121.32 | 98.73 | 127.88 | 101.81 | 141 | 103.58 | 163.95 | 103.46 |
| 193.46 | 102.59 | 216.42 | 103.05 | 275.44 | 103.07 | 288.56 | 102.27 | 308.23 | 102.59 |
| 331.18 | 104.54 | 354.14 | 104.45 | 370.53 | 95.67 | 386.93 | 92.11 | 413.16 | 82.07 |
| 609.9 | 82.06 | 639.41 | 84.25 | 662.37 | 90.65 | 672.2 | 95.56 | 678.76 | 97.05 |
| 691.88 | 96.39 | 701.71 | 99.45 | 718.11 | 99.06 | 744.34 | 100.53 | 760.74 | 98.27 |
| 809.92 | 96.8 | 826.32 | 97.06 | 836.16 | 98.44 | 852.55 | 96.64 | 875.5 | 97.42 |
| 908.29 | 100.48 | 921.41 | 100.75 | 927.97 | 102.75 | 944.36 | 102.93 | 973.88 | 105.65 |
| 983.71 | | 1009.95 | | 1019.78 | | 1042.74 | | 1068.97 | 104.62 |
| 1082.08 | | 1114.87 | | 1154.22 | | 1167.34 | | 1187.01 | 106.87 |
| 1213.25
1311.62 | | 1223.08 | | 1262.43
1373.92 | | 1275.55
1380.48 | | 1291.94
1413.27 | 103.73
102.65 |
| 1442.78 | | 1449.34 | | 1528.03 | | 1541.15 | 105.32 | 1564.1 | 104.93 |
| 1573.94 | | 1590.33 | | 1596.89 | | 1613.29 | | 1675.59 | 105.43 |
| 1688.71 | | 1728.05 | | 1757.57 | | 1777.24 | | 1796.91 | 106.59 |
| 1829.7 | | 1842.82 | | 1849.38 | | 1872.33 | | 1882.17 | 106.91 |
| 1898.56 | 105.33 | 1931.35 | 106.33 | 1954.31 | | 1983.82 | | 2016.61 | 106.12 |
| 2069.07 | | 2095.31 | | 2105.14 | | 2118.26 | 105.54 | 2174 | 104.7 |
| 2193.68 | | 2210.07 | | 2223.19 | | 2236.31 | | 2262.54 | 105.96 |
| 2272.37 | | 2292.05 | | 2305.17 | | 2344.51 | | 2354.35 | 105.16 |
| 2393.7 | | 2426.49 | | 2449.44 | 105.89 | 2472.4 | | 2511.75 | 105.46 |
| 2531.42
2656.02 | | 2547.82
2682.26 | | 2557.65
2711.77 | | 2606.84
2724.89 | | 2623.23
2741.28 | 103.77
105.59 |
| 2774.07 | | 2803.58 | | 2859.33 | | 2872.44 | | 2901.95 | 105.68 |
| 2934.74 | | 2947.86 | | 2974.09 | | 2997.05 | | 3029.84 | 104.65 |
| 3042.95 | | 3056.07 | | 3085.58 | | 3118.37 | | 3164.28 | 112.76 |
| 3220.02 | | 3229.86 | | 3259.37 | | 3292.16 | | 3305.28 | 112.64 |
| 3351.18 | 115.72 | 3380.7 | | 3400.37 | 119.64 | 3413.49 | 119.45 | 3429.88 | 117.69 |
| 3482.35 | | 3502.02 | | 3574.16 | 117.98 | | | 3623.35 | 118.62 |
| 3662.69 | | 3675.81 | | 3692.21 | | 3718.44 | | 3751.23 | 118.48 |
| 3806.97 | | 3826.65 | | 3833.21 | | 3859.44 | | 3872.55 | 108.77 |
| 3888.95
4000.44 | | 3895.51
4049.62 | | 3931.58
4079.13 | | 3954.53 | 102.44 | 3974.2 | 104.29 |
| 4141.44 | | 4167.67 | | 4177.51 | 103
84 32 | 4115.2
4197.51 | | 4131.6
4238.51 | 72.94 |
| 4270.51 | | 4297.51 | | 4313.51 | | 4327.51 | | 4367.51 | 75.94 |
| 4379.51 | | 4400.51 | | 4409.51 | | 4413.55 | | 4423.38 | 86.38 |
| 4436.5 | | 4456.17 | 88.33 | 4466 | 87.78 | 4492.23 | | 4498.78 | 91.51 |
| 4515.17 | 98.12 | 4538.12 | | 4544.68 | 105.53 | 4570.91 | | 4626.64 | 105.83 |
| 4652.86 | | 4679.09 | | 4724.99 | 106.25 | 4738.1 | | 4754.49 | 108.74 |
| 4777.44 | | 4829.89 | | 4843.01 | | 4852.84 | | 4879.07 | 105.99 |
| 4905.29 | | 4921.69 | | 4957.75 | | 5003.64 | | 5069.21 | 101.7 |
| 5079.05
5193.79 | | 5108.55
5203.62 | | 5138.06
5233.13 | | 5147.89
5249.52 | 101.05 | 5161
5272.47 | 100.07 |
| 5311.81 | | 5347.87 | | 5370.82 | | 5406.88 | | 5423.27 | 99.71 |
| 5456.05 | | 5465.89 | | 5492.12 | | 5508.51 | | 5541.29 | 99.7 |
| 5554.4 | | 5570.79 | | 5580.63 | 98.96 | 5600.3 | | 5613.41 | 103.19 |
| 5652.75 | 103.16 | 5659.31 | 102.56 | 5715.04 | 101.26 | 5734.71 | 96.12 | 5760.94 | 94.54 |
| 5793.72 | | 5846.17 | 95.96 | 5872.4 | | 5931.41 | 96.8 | 5947.8 | 98.7 |
| 5967.47 | | 5990.42 | | 6000.25 | 96.46 | 6023.2 | | 6088.77 | 92.49 |
| 6105.16 | | 6118.27 | | 6144.51 | | 6164.19 | | 6206.82 | 93.03 |
| 6226.5
6360.96 | | 6256.01
6374.07 | | 6265.85
6397.03 | | 6308.48
6406.87 | | 6334.72
6436.38 | 98.77
105.85 |
| 6475.74 | | 6498.69 | | 6528.21 | | 6649.55 | | 6672.51 | 105.74 |
| 6698.74 | | 6724.98 | | 6767.61 | | 6836.48 | | 6895.51 | 104.93 |
| 6905.35 | | 6918.47 | | 6964.38 | | 6980.78 | | 7020.13 | 105.89 |
| 7059.49 | | 7161.15 | | 7266.09 | | 7334.96 | | 7357.92 | 107.02 |
| 7374.32 | | 7423.51 | | 7439.91 | 107.49 | 7512.06 | | 7561.25 | 106.3 |
| 7574.37 | | 7613.72 | | 7659.63 | 104.81 | 7728.5 | | 7754.74 | 103.97 |
| 7780.97
7954.79 | | 7807.21 | | 7836.73 | 106.28 | 7872.8 | | 7902.31 | 106.65 |
| 8105.64 | | 7994.14
8167.95 | 106.17 | 8030.21
8256.5 | | 8049.89
8279.46 | | 8059.73
8302.42 | 107.6
105.86 |
| 8312.26 | | 8331.94 | | 8381.13 | | 8390.97 | | 8430.33 | 106.65 |
| 8463.12 | | 8548.39 | | 8561.51 | | 8627.11 | | 8653.34 | 106.41 |
| 8669.74 | | 8702.54 | 107.12 | 8725.5 | | 8755.01 | | 8787.81 | 110.41 |
| 8807.49 | | 8814.05 | | 8843.57 | 100.95 | 8863.24 | 100.87 | 8879.64 | 101.63 |
| 8905.88 | | 8922.28 | 102.23 | 8935.4 | | 8951.79 | | 8964.91 | 101.43 |
| 9000.99 | | | | | | | | 9076.42 | |
| 9096.1 | | 9132.18 | 97.4 | 9145.3 | | 9155.13 | | 9168.25 | 97.61 |
| 9184.65 | | 9201.05 | | 9224.01 | | 9269.92
9463.42 | 105.52 | 9289.6 | 105.84 |
| 9378.15
9545.42 | | 9414.23
9558.54 | | 9437.19
9637.25 | | 9463.42 | 106.26 | 9515.9
9702.84 | 106.47
104.75 |
| 9729.08 | 103.61 | 9758.6 | | 9768.43 | | 9794.67 | | 9850.43 | 104.75 |
| 9899.62 | | 9916.02 | 106.98 | 9935.7 | | 9971.77 | | 10001.29 | 107.95 |
| 10037.37 | | 10073.44 | | 10096.4 | | 10132.48 | | 10148.88 | 108.25 |
| 10168.56 | | L0204.63 | | 10237.43 | 106.483 | 10253.83 | | 10266.95 | 105.47 |
| 10299.74 | | 10322.7 | | L0329.26 | | 10358.78 | | 10375.17 | 105.12 |
| 10394.85 | | 10407.97 | | 10444.05 | | 10450.61 | | 10480.12 | 107.18 |
| 10489.96 | 107 | 10499.8 | 99.93 | 10512.92 | 97.85 | 10526.04 | 98.7 | 10539.16 | 106.11 |
| | | | | | | | | | |

```
10545.72 107.1810585.07 106.2110594.91
                                                     106.610617.87
                                                                         95.0810637.55
10644.11
             98.1510667.07
                               100.1710696.58
97.7910765.46
                                                   100.2310716.26
                                                                       98.6810729.38
106.4810857.29
                               106.59 10936
105.1311106.54
10893.36
            106.09 10903.2
                                                     105.810988.47
                                                                       105.1111037.67
                                                                                           105.07
11067.19
            105.5711093.42
                                                   105.7611136.06
                                                                        105.8911273.81
11303.32
             105.811316.44
                                104.9611342.68
                                                    104.6111352.52
                                                                       105.3311375.48
                                                                                           103.89
            103.4411480.43
                               105.311519.78
103.8111683.77
                                                   106.31 11565.7
105.0611700.17
                                                                       102.7211608.33
105.2911713.28
11631.29
11732.96
             104.511769.04
                               103.4911801.83
102.8611946.14
                                                    103.5611814.95
                                                                       104.3711851.03
                                                    104.8511992.06
           106.2912044.53
107.0912215.07
105.5412329.86
                               107.4512064.21
107.1812244.59
108.512346.26
                                                   107.8212080.61
107.7612283.95
109.3812362.66
12031.41
                                                                        107.312106.85
                                                                                            108.4
                                                                       106.0112297.07
12310.19
                                                                       111.2612379.06
12392.18 113.95 12405.3 110.4112434.81 107.8512451.21
Manning's n Values num= 6
Sta n Val Sta n Val Sta
0 .066 19.67 .12 4197.51
                                                    n Val
                                                                          .12 5652.75
                                                     .025 4423.38
Coeff Contr.
                                                                                            Expan.
                                             Elevation= 122.78
Elevation= 114.22
Right Levee Station-12...

Blocked Obstructions num=
Sta T. Sta R Elev
  331.18 973.88 104.54
CROSS SECTION OUTPUT Profile #Design Flow
```

| E.G. Elev (ft) | 115.64 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|--------------|
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.120 | 0.078 | 0.074 |
| W.S. Elev (ft) | 115.61 | Reach Len. (ft) | 2695.37 | 2260.89 | 1608.69 |
| Crit W.S. (ft) | 96.63 | Flow Area (sq ft) | 35768.70 | 13534.22 | 76716.83 |
| E.G. Slope (ft/ft) | 0.000125 | Area (sq ft) | 36560.40 | 13534.22 | 90820.73 |
| Q Total (cfs) | 130000.00 | Flow (cfs) | 23409.46 | 28545.68 | 78044.86 |
| Top Width (ft) | 11944.35 | Top Width (ft) | 3562.42 | 422.92 | 7959.01 |
| Vel Total (ft/s) | 1.03 | Avg. Vel. (ft/s) | 0.65 | 2.11 | 1.02 |
| Max Chl Dpth (ft) | 42.67 | Hydr. Depth (ft) | 10.04 | 32.00 | 9.64 |
| Conv. Total (cfs) | 11632690.0 | Conv. (cfs) | 2094731.0 | 2554331 | .0 6983629.0 |
| Length Wtd. (ft) | 2091.78 | Wetted Per. (ft) | 3572.06 | 437.71 | 7993.26 |
| Min Ch El (ft) | 72.94 | Shear (lb/sq ft) | 0.08 | 0.24 | 0.07 |
| Alpha | 1.57 | Stream Power (lb/ft s) | 0.05 | 0.51 | 0.08 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 165162.20 | 59805.06 | 195452.60 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 20947.83 | 2529.48 | 23625.65 |
| | | | | | |

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface

The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than Warning: This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande

RS: 161.4

TNIDITT

Description: Updated on left with new survey to Station 1032.71, extended cross-section and block obstruction, Bathymetric elevations translated from IBWC 2008 Cross-sections

Lom II La num= Sta = Station Elevation Data 458 Elev Sta 96.61 99.97 104.26 204.94 105.1 548.84 102.25 600.00 Sta Elev 0 95.84 Elev 95.75 Sta 74.98 Elev Sta 97.17 122.96 104.44 314.91 150.96 103.86 175.95 104.45 191.94 449.87 104.56 483.86 104.75 517.85 104.01 104.37 580.83 103.36 606.83 870.75 102.93 657.81 102.11 918.74 102.6 666.81 101.77 928.74 120.67 1006.72 102.25 696.8 938.73 102.51 102.74 749.79 119.77 1032.71 967 73 112.55 989.72 121 09 1013 71 96.61 1154.85 98.87 1354.98 100.7 1538.71 101.8 1627.29 96.43 1118.76 99.19 1332.01 96.41 1200.78 99.32 1417.32 96.7 1279.52 99.3 1476.37 1312.33 99.92 1512.46 101.09 1591.2 100.45 1548.55 100.88 1660.1 100.82 1558.39 101.86 1689.63 1499.34 1574.8 100.4 1771.65 101.77 1863.51 102.27 1988.18 102.52 2086.61 101.59 1758.52 102.31 1850.39 101.82 1971.78 100.31 1797.89 102.81 1909.44 102.8 2014.43 102.04 1824.14 102.52 1919.29 1719.15 1840.55 1935 69 102.82 2027.55 102.8 2014.43 101.48 2106.29 102.44 2237.52 102.18 2391.72 100.69 2490.14 104.2 2060.36 102.74 2119.42 102.79 2286.74 101.94 2175.19 102.27 2335.95 100.69 2440.93 2165.35 102.41 2214.56 102.54 2349.07 100.06 2460.62 101.81 2421.25 99.75 2503.27 2309.7 2434.37 2513.11 100.62 2529.51 100.46 2601.69 100.76 2542.64 102.79 2614.81 102.53 2549.2 100.33 2637.78 102.46 2562.32 100.28 2657.46 2572.16 100.79 2614.81 100.73 2709.96 102.81 2755.89 102.97 2877.28 103.18 2975.7 101.61 3070.84 101.24 2700.11 105.88 2746.04 101.14 2723.08 101.87 2769.01 103.21 2729.64 102.25 2798.54 2677.15 2736.2 102.29 2854.31 102.77 2926.49 103.08 3047.88 104.69 2883.84 2831.35 105.66 2900.24 103.17 2985.54 102.98 3097.09 103.56 2998.66 103.55 3103.65 2910.08 3031.47 101.61 3070.84 105.55 3182.39 106.01 3248 103.5 3320.18 99.8 3398.92 93.57 3480.94 86.16 3556.4 100.02 3684.35 103.08 3047.88 104.58 3149.58 103.57 3231.6 105.42 3300.5 103.26 3389.08 3136.46 3218.48 104.61 3195.51 104.95 3257.85 105.13 3211.92 105.53 3270.97 103.01 3336.58 99.85 3412.04 105.12 3346.43 96.97 3444.85 3287.37 3454.69 92.84 3467.82 91.83 3500.62 95.77 3579.36 102.62 3710.48 85.69 3507.18 84.99 3530.15 101.44 3595.77 102.05 3730.09 99.73 3667.94 95.48 3762.76 84.22 3833.11 3612.17 3749.69 3828.11 91.86 3801.97 78.33 3841.11 90.83 3808.5 73.66 3851.11 89.86 3818.3 72.06 3861.11 72.06 3911.11 75.96 3991.11 74.36 3931.11 76.66 4021.11 73.66 3941.11 77.36 4031.11 75.66 3971.11 78.33 4036.11 3881.11 4043 74 84 22 4050 28 84.41 4063.35 89.63 4128.69 88.53 4076.42 94.11 4086.22 89.84 4151.56 102.61 4236.51 103.27 4350.86 104.05 4498.18 90.49 4112.36 100.86 4180.97 93.95 4167.9 103.13 4259.38 102.14 4223.44 4174.43 4275.72 102.76 4324.72 105.96 4406.4 102.69 4331.26 106.24 4465.38 107.1 4363.93 107.7 103.11 4557.24 102.55 4393.33 4593.33 102.41 4613.01 102.92 4635.98 102.13 4754.08 101.57 4809.86 102.21 4675.34 102.32 4691.75 101.97 101.67 4852.51 101.39 4878.75 101.56

```
100.98 4980.46
                                                                      101 5003.42 101.34 5059.19 101.45 5095.28 102.03 
1.16 5147.77 98.51 5167.46 99.37 5187.14 105.16 
03.3 5249.48 103.08 5275.72 101.24 5282.29 101.45
                                                             101.16 5147.77
103.3 5249.48
101.17 5321.65
  5131.37
5210.11
                        101.92 5137.93
104.9 5229.79
                        100.45 5311.81
101.57 5410.24
   5298.69
                                                                                                     100.58 5338.06
                                                                                                                                           101.19
                                                                                                                                                              5347.9
                                                                                                                                                                                  100.96
                                                              101.17 5321.05
101.84 5423.36
103.52 5521.78
105.3 5593.96
106.55 5685.82
                                                                                                                                           102.05 5459.45
                                                                                                     101.47 5429.92
   5479.13
                          101.8 5492.25
                                                                                                     103.08 5528.34
                                                                                                                                           103.91 5551.31
                                                                                                                                                                                  103.29
                       101.8 5492.25
103.54 5580.83
108.55 5666.13
102.95 5761.28
100.42 5836.73
                                                                                                     105.96 5607.08
106.3 5708.78
                                                                                                                                          108.13 5639.89
105.28 5741.59
   5653.01
                                                             100.55 5885.82
100.41 5767.84
102.8 5843.3
107.39 5915.47
107.98 6027.02
108.16 6174.65
                                                                                                                                           98.99 5800.65
104.94 5859.7
107.85 5951.56
107.84 6092.63
109.4 6233.71
   5751.43
                                                                                                       100.7
                                                                                                                      5790.8
                                                                                                     105.55 5849.86
                       108.41 5892.51
108.13 6020.46
107.93 6151.69
109.08 6269.79
   5872.82
                                                                                                     108.22 5935.16
                                                                                                     107.51 6063.11
109.14 6197.62
     6099.2
                                                              108.64 6338.69
108.35 6499.45
                                                                                                     108.96 6401.03
107.17 6519.13
                                                                                                                                           108.46 6427.27
107.63 6528.98
   6259.95
   6479.76
                        108.16 6492.89
                                                                                                                                                                                    107.3
                       107.96 6630.68
107.63 6824.24
107.55 6935.79
107.56 7221.22
107.94 7385.25
                                                             107.72 6663.49
107.46 6853.77
107.91 6985
107.61 7270.43
108.33 7427.9
                                                                                                    107.17 6519.13
107.92 6693.01
107.76 6883.3
107.92 7034.21
108.05 7326.2
108.1 7434.47
  6561.78
6768.47
                                                                                                                                             107.8 6748.79
                                                                                                                                           107.8 6748.79
107.53 6896.42
107.56 7057.18
107.48 7342.6
109.2 7467.27
     6916.1
   7368.85
                                                             108.33 7427.9
108.58 7588.66
109.29 7723.17
109.27 7851.12
108.57 8038.13
107.65 8225.13
105.93 8316.98
103.53 8402.28
                                                                                                                                          109.2 7467.27
109.06 7660.84
108.63 7752.7
108.26 7939.7
107.76 8097.18
   7519.77
7677.24
                        108.08 7546.01
109.12 7706.77
                                                                                                    108.58 7634.59
108.47 7742.86
                        110.23 7815.03
108.03 8008.6
   7772.38
7995.48
                                                                                                     109.34 7874.09
108.54 8051.25
                        107.02 8205.44
107.35 8290.74
                                                                                                     106.5 8254.65
105.87 8326.83
   8136.55
                                                                                                                                           106.39 8271.06
                                                                                                                                           105.1 8333.39
106.57 8444.93
   8339.95
                        104.18 8359.63
                                                                                                     104.39
                                                                                                                      8431.8
                                                                                                     107.09 8582.71
106.08 8671.29
   8481.01
8618.8
                        106.15 8513.82
104.09 8645.04
                                                              106.85 8540.06
104.78 8658.17
                                                                                                                                           105.89 8595.83
105.24 8713.94
                        104.81 8782.83
103.75 8933.74
   8733 62
                                                              103.92 8835.32
                                                                                                     103.54 8868.12
                                                                                                                                           102.84 8881.25
   8914.05
                                                              102.92 8943.58
                                                                                                     103.58 8992.79
                                                                                                                                           103.64 9019.03 105.67
                       106.61 9051.84
106.3 9160.1
103.41 9271.64
                                                              106.65 9071.52
106.99 9189.62
101.91 9301.16
  9038.72
9130.57
                                                                                                                                           105.89 9107.61
106.31 9232.27
                                                                                                     105.08 9084.64
                                                                                                                                                                                    106.6
                                                                                                    105.08 9084.64
106.05 9199.46
101.96 9327.41
101.75 9412.7
96.75 9517.68
   9258.52
                                                                                                                                           101.12 9356.93
                                                                                                                                                                                 101.36
                        103.41 9271.04
102.46 9386.46
97.47 9484.88
95.96 9625.94
96.23 9793.25
                                                              101.58 9402.86
96.21 9498
                                                                                                                                           101.12 9336.93
100.53 9448.79
96.08 9540.65
96.59 9714.52
96.95 9862.15
   9461.91
                                                                96.21 9498
96.23 9671.87
98.19 9809.66
97.32 9917.92
                                                                                                       96.02 9704.68
98.65 9829.34
97.79 9927.76
   9576 73
                             96.3 9891.67
                                                                                                                                          100.14 9934.32
   9878.55
                                                                                                     102.87 9999.93
                                                              104.8810075.38
105.2110190.21
109.2610301.75
                                                                                                                                           105.0810127.87
105.4910268.94
 10045.86
10137.72
                          105.810065.54
                                                                                                    103.9410101.63
                                                                                                                                                                                  105.39
                        105.13 10173.8
107.4810285.34
                                                                                                       105.610252.54
                                                                                                     108.8510327.99
 10278.78
                                                                                                                                           109.6410344.39
 10364.08
                        108.3310396.88
105.2810514.98
                                                              107.2710410.01
106.0810531.39
                                                                                                    105.9710436.25
107.7110544.51
                                                                                                                                           105.4410446.09
106.6510574.04
 10600.28
                        105.6110646.21
                                                              106.2110659.33
                                                                                                    105.6910672.45
                                                                                                                                           106.1210692.14
                        106.3210764.31
                                                              106.4110839.76
                                                                                                     105.6410905.38
                                                                                                                                           106.0810974.27
107.6511108.77
 11000.51 106.1311023.48 107.0211056.28
11128.46 105.28 11138.3 105.7311174.38
11213.75 114.6711230.16 111.5111259.68
                                                              107.0211056.28
105.7311174.38
                                                                                                   106.0111092.37
11011180.95
                                                                                                                                           113.0411187.51
                                                                                                  108.99
 Manning's n Values
                                                              num=
           Sta n Val Sta
0 .108 3320.18
9.38 .144
                                                              n Val
                                                                                                                                             n Val
                                                                                                                                                                                   n Val
                                                  Sta
                                                                                         Sta
                                                                                                      n Val
                                                                                                        .066 3762.76
                                                                  .108 3336.58
                                                                                                                                                .015 4063.35
  4259.38

        Bank
        Sta:
        Left
        Right
        Lengths:
        Left
        Channel
        Right

        3684.35
        4259.38
        2304.01
        1690.29
        1564.64

        Left
        Leve
        Station=1006.72
        Elevation=
        121.09

        Right
        Leve
        Station=1213.75
        Elevation=
        114.67

                                                                                                                                               Coeff Contr. Expan.
| State | Stat
CROSS SECTION OUTPUT Profile #Design Flow
                                                             115.43
                                                                                                                                                        Left OB
                                                                                                                                                                                                           Right OB 0.144
     E.G. Elev (ft)
                                                                                           Element
                                                                                                                                                                                 Channel
     Vel Head (ft)
                                                                                           Wt. n-Val.
                                                                                                                                                            0.099
                                                                                         Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                                                                                                            1564.64
     W.S. Elev (ft)
Crit W.S. (ft)
                                                                 115.03
                                                                                                                                                       2304.01
                                                                                                                                                                                  1690.29
                                                             97.27
0.000059
     E.G. Slope (ft/ft)
                                                                                                                                                     31876.77
                                                                                                                                                                               15514.18
                                                                                                                                                                                                          55998.07
                                                                                                                                                                                                            17722.16
     Q Total (cfs)
                                                              130000.00
                                                                                                                                                        19147.05
                                                                                                                                                                                 93130.79
     Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                                                                                                   575.03
                                                             10234.25
                                                                                                                                                       2658.92
                                                                                                                                                                                                             7000.30
                                                                                                                                                         0.60
                                                                        1 26
                                                                                                                                                                                         6 00
                                                                      43.37
                                                                                                                                                                                      26.98
                                                                                                                                                                                                                   8.00
     Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                           Conv. (cfs)
Wetted Per. (ft)
                                                              16937400.0
                                                                                                                                                          2494624 0
                                                                                                                                                                                      12133790 0
                                                                                                                                                                                                                     2308979 0
                                                                                                                                                       2664.04
                                                                1814.65
                                                                                                                                                                                   587.68
                                                                                                                                                                                                             7010.55
                                                                                           Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                                                                                                                   0.10
                                                                      71.66
                                                                                                                                                                                                                   0.03
                                                                                                                                                    0.04
0.03
163044.90
                                                                                                                                                                                 0.58
59051.21
     Alpha
Frctn Loss (ft)
                                                                      16.37
                                                                                                                                                                                                           192741.50
                                                                        0.08
     C & E Loss (ft)
                                                                       0.06
                                                                                          Cum SA (acres)
                                                                                                                                                    20755.35
                                                                                                                                                                                 2503.58
                                                                                                                                                                                                        23349.43
 Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
 RIVER: Rio Grande
 REACH: Lower Reach
                                                            RS: 161.35
Description: RGV-04, New Cross-Section, Begin Wall, Updated on left with new
                               survey to Station 3215.65, Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data num=
Sta Elev Sta Ele
                                                                                    441
          Sta Eie.
0 112.07
                                                             Elev
110.22
                                                                                       Sta
                                                                                                  110.29 137.99 107.98 151.99 108.87 112.54 581.93 118.75 614.93 119.42 117.78 889.89 113.11 952.89 109.61
                                                    49
                                                                                    93.99
                       107.62 322.96
                                                              108.34 444.95
                        118.86
                                                              116.43
                                                                                    861.9
     756.91
                                             813.9
                        105.57 1146.86
100.73 1467.83
  1048.87
1457.83
                                                                100.2 1289.85
98.73 1570.82
                                                                                                      98.39 1386.84
97.02 2066.76
                                                                                                                                             98.45 1404.83
97.46 2400.73
                                                                98.58 2875.68
90.66 3431.35
   2775.69
                          98.17 2845.69
                                                                                                       96.24 3123.66
                                                                                                                                              96.24 3215.65
   3779 08
                            92.3 3808.6
92.7 4372.85
                                                                 92 46 4084 16
                                                                                                       92 78 4090 72
                                                                                                                                              92 59 4235 06
```

93.18 4389.25 95.04 4704.19

94.59 5068.34 101.24 5340.63

94.26 4628.74

95.92 4868.22 100.08 5238.93

98.68 5475.13 98.69 5488.26 101.37 5845.84 101.54 5901.61

4563.12

4809.17

5225.81

5425.92

92.95 4415.5 97.29 4763.24

94.64 5170.04 100.69 5347.19

100.48 5619.48

94.92 4435.18 96.55 4792.77

94.97 5202.84 97.71 5393.12

100.76 5639.16 101.48 6072.2

95.3

97.82

101.46 6400.26 101.69 6406.82 100.26 6462.59

101.75 6354.33

```
6492.12
7528.79
               101.02 6679.11
                                      101.21 6797.21
103.43 7653.45
                                                               101.6 7371.32
103.14 7679.7
                                                                                      101.79 7509.11
103.92 7827.32
                                                                                                              102.34
                                                              105.61 8398.13
 8342.36
               104.15 8355.48
                                      103.54 8385.01
                                                                                      100.08 8407.97
 8440.77
                79.73 8447.33
                                        79.46 8617.91
                                                                79.46 8634.31
                                                                                        80.39 8653.99
                                                                91.47 8703.19
 8663.83
                89.94 8676.95
                                        92.24 8686.79
                                                                                       85.12 8719.59
                                                                                                               83.35
                84.78 8765.52
95.97 8877.05
                                      94.2 8804.88
102.53 8903.29
                                                              96.06 8818
100.07 8913.13
                                                                                     98.41 8850.81
102.04 8926.25
 8860.65
 8942.65
                96.74 8972.18
                                       91.76 8991.86
93.2 9109.95
                                                               89.79 9047.62
                                                                                       90.44 9060.74
                                                                                                                 91.9
                                      93.2 9109.95
89.88 9182.11
95.26 9283.8
102.81 9408.45
101.62 9585.59
103.42 9782.4
102.13 9998.9
102.1810146.51
                                                              88.34 9195.23
102.64 9296.92
101.98 9457.66
                                                                                      89.36 9221.48
101.18 9313.32
103.99 9477.34
 9149.31
                87.18 9165.71
                                                                                                               88.58
               90.03 9264.12
101.58 9349.41
102.83 9546.22
 9326.45
                                                                                      101.5 9687.28
103.17 9831.61
                                                              103.34 9674.15
104.29 9815.21
 9519.98
              102.83 9546.22
104.06 9759.44
101.07 9930.02
101.5710130.11
 9739.76
 9880.81
                                                             102.1710021.86
101.0110208.84
                                                                                      101.310077.63
101.6310284.29
              101.69 10382.7
104.3410697.62
                                      100.9910408.94
105.7610714.02
                                                                                      100.9410556.56
105.3510779.63
10343.33
                                                               101.510445.03
                                                              103.9510756.67
                                                                                                              113.23
10799.31
               107.0110855.08
                                       108.310881.32
                                                              109.6310950.21
                                                                                      115.2210983.02
              113.5511068.31
122.8611252.02
                                      118.1611124.08
119.6911265.14
                                                             118.88 11153.6
119.3811304.51
                                                                                      120.3211176.57 122.42
115.511347.15 114.41
11032.23
11219.21
11399.64
11639.11
              105.88 11439
101.0511671.92
                                      102.7811478.37
101.4711698.16
                                                              104.311517.73
103.1911744.09
                                                                                      103.211609.59
103.3711796.58
                                      102.4411894.99
101.5512081.98
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               104.0111855.62
                                                              101.3711914.67
                                                                                      102.5611950.76
                                                                                                              102.73
              101.4212059.01
106.0712236.16
                                                             106.0912308.33
108.2912570.76
100.5 12784
72.0612867.77
75.6612997.77
                                                                                                               106.5
12209.91
                                      104.0312301.76
                                                                                      107.3112334.57
12403.46
              109.3412432.98
103.43 12682.3
                                      109.89 12515
101.4212738.07
                                                                                      105.912600.29 103.07
101.3312793.84 99.1
12610.13
                                                                                       71.6612887.77
76.6613027.77
                                                                                                               72.06
77.36
12839 77
                78.7712847.77
                                       73.6612857.77
                74.3612937.77
                                        73.6612947.77
12917.77
                                                                                      91.1113115.32
102.7213282.63
13037.77
                78.3313066.11
                                        78.7713082.52
                                                               81.2113098.92
                                                              101.6713249.82
                                                              100.3113689.41
105.2413876.39
101.8914083.06
                                                                                      100.19 13758.3
105.7113892.79
101.3714122.43
13440.09
               100.3413482.74
                                      100.03 13623.8
                                                                                                               101.1
               102.6613810.78
105.0813938.72
                                      105.6213866.55
102.9414014.17
 13909.2
              100.8814230.69
103.6314558.73
                                                              102.3214378.31
105.0114607.94
                                                                                      100.9414466.88
106.3614617.78
 14194 6
                                      101.0314296.29
                                                                                                              101 81
                                       105.6214575.14
14539.05
14673.55
               105.8214716.19
                                      108.1614742.44
                                                              106.04 14765.4
                                                                                      105.414929.42
                                       105.2115139.38
                                                               105.615198.42
                                      105.08 15588.8
104.2515861.08
105.8916166.16
                                                                                      104.7315726.58
105.0415949.65
105.5416280.97
                                                               104.115615.04
15405.09
               104.8715424.77
                                                                                                              104.49
                                                             105.48 15890.6
106.3216244.89
15785.62
               104.8215831.55
16011.98
                105.5 16159.6
                                      105.8616451.57
105.4417075.01
107.9217534.39
103.6417780.48
              105.2816435.17
105.92 16884.7
                                                              105.5516576.26
106.217321.11
16307 22
                                                                                      105.6816681.26
                                                                                      106.5717376.89
                                                              105.63 17567.2
17458 92
               106.0817491.73
                                                                                      106.5517629.54
                                                              102.2317793.61
                                                                                      103.0217806.73
17816.57
               103.2517832.98
                                       103.717842.82
                                                              102.2517865.79
                                                                                      103.7817888.76
                                                                                                              103.05
              105.04 17934.7
106.6518134.86
                                                              102.58 17987.2
105.4118233.29
                                      102.4317954.39
18105.32
                                      104.9318203.76
                                                                                      104.6618252.98
                                                                                                              106.15
              104.9718328.45
106.5918558.14
                                      105.3918364.54
105.8718590.95
                                                             107.1718397.36
106.218600.79
                                                                                      105.9218443.29
107.59 18617.2
18282.51
                                                                                                              105 65
18522.04
                                                             106.218000.79
106.9218755.01
106.3319158.61
105.6219424.39
18640 17
               106.5118695.95
                                      106 2818718 92
                                                                                      105.8118840.32
              105.11 19037.2
107.4919270.17
                                      106.9119096.26
106.3119319.39
19260.32
                                                                                      106.8219483.45
                                                                                                              106.22
                                                              107.44 19667.2
114.4819782.04
               107.1219565.48
                                      106.2619608.14
                                                                                      105.0719693.45
19706.57
               110.0219732.82
                                       109.619755.79
                                                                                      114.7619798.45
                                                                                                              110.38
              110.0219732.82
110.6919913.29
107.8220149.54
107.8620356.26
107.5220579.39
                                      108.3719972.36
107.2920165.95
107.7720412.04
19811 57
                                                             107.8320001.89
108.0720202.04
                                                                                      108.39 20034.7
107.4120254.54
20123.29
                                                                                      106.6320461.26
20290 64
                                                              108.5320425.17
                                       106.9720602.36
                                                              107.6120697.51
                                                                                      107.1920730.32
                                      107.5720818.92
20766.42
               106.9820802.51
                                                              106.1920956.73
                                                                                      106.6121005.95
                                                                                                              105.69
              105.6821124.07
108.0621337.36
                                                             105.2621202.82
107.5921380.01
                                                                                      107.2521291.42
106.6721412.82
21081.42
                                       106.6321163.45
                                      106.9221373.45
21301.26
              107.3521514.54
105.9121649.07
                                      106.5221583.45
107.1921668.76
                                                              106.221599.86
105.6421695.01
                                                                                      105.5721616.26
105.09 21714.7
21494.86
21639.23
                                                                                                              106.69
              10621842.67
106.1522101.89
                                                              107.0821888.61
105.9922242.98
                                                                                      106.4521983.76
105.8922311.89
21793 45
                                      106.3221852.51
                                        105.222164.23
 22344.7
               105.0622384.07
                                      105.0822426.73
                                                              105.8922469.39
107.2422708.92
                                                                                      105.97 22502.2
                                                                                                              107.28
                                      107.5922685.95
107.6122833.61
22551.42
               106.3722610.48
                                                                                      110.8222725.32
               106.7522813.92
                                                               109.622859.86
22790.95
                                                                                      110.6222866.42
                                                                                                              112.63
22879.54
                                                             125.4723000.95
125.2823250.32
                                                                                        126.123037.04
               121.4422915.64
                                      126.0522977.98
                                      125.8523197.82
                                                                                      121.4223279.86
23056.73
              125.6823115.79
23315.95 115.7923335.64 105.0423355.32
                                                               99.9723368.45
                                                                                        98.0523378.29
23384.86
Manning's n Values
               n Values num= 5
n Val Sta n Val Sta
.108 12784 .06612793.84
             n Val
                                                              n Val
                                                                                       n Val
                                                                               Sta
                                                                                                               n Val
                                                               .01513115.32
                                                                                        .06613249.82
Bank Sta: Left Right Lengths: Left Channel Right 1278413115.32 427.09 384.49 366.72

Ineffective Flow num= 1
Sta L Sta R Elev Permanent 0 12784 101.33 T

Left Levee Station= 614.93 Elevation= 119.42

Right Levee Station=19782.04 Elevation= 114.76
                                                                                         Coeff Contr.
                                                                                                               Expan.
                                                       Elevation= 119.42
Elevation= 114.76
Blocked Obstructions num=
Sta L Sta R Elev
010556.56 105.07
                                                    1
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                                        Element
                                                                                                               Channel
                                                                                                                              Right OB
                                        0.20
                                                       Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                               0.108
427.09
                                                                                                               0.017
384.49
                                           95.92
                                                                                            115119.60
                                                                                                              11734.11
                                                                                                                              94110.11
                                0.000034
                                                                                            115189.20
                                                                                                              11734.11
   E.G. Slope (ft/ft)
                                                                                                                               94110.11
   O Total (cfs)
                                      130000.00
                                                         Flow (cfs)
                                                                                             42495.67
                                                                                                              61469.49
                                                                                                                               26034.83
   Top Width (ft)
Vel Total (ft/s)
                                                        Top Width (ft)
                                                                                            11625.70
                                                                                                               331.32
                                                        Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                                                  5.24
                                            0.59
                                                                                                                                   0.28
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                           43.43
                                                                                                  9.90
                                                                                                                35.42
10607130.0
                                                                                                7333021.0
                                      22432700.0
                                                                                                                                    4492551.0
                                        393.06
                                                                                            11628.76
                                                                                                               342.65
                                                                                                                              9863.47
   Min Ch El (ft)
                                                                                                                  0.07
   Alpha
                                           37.66
                                                        Stream Power (lb/ft s)
                                                                                                  0.01
                                                                                                                  0.38
                                                                                                                                   0.01
   Frctn Loss (ft)
                                                        Cum Volume (acre-ft)
   C & E Loss (ft)
                                                                                                                            23047.30
                                            0.00
                                                        Cum SA (acres)
                                                                                            20377.57
                                                                                                              2485.99
```

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 161.3

Description: RGV-04, New Cross-section, End wall, Updated on left with new survey to Station 969.97, Bathymetric elevations translated from IBWC 2008 Cross-sections

Station Elevation Data num= 475

| | levation Data | num= 475 | | | |
|----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------|
| Sta | Elev Sta | Elev Sta | Elev Sta | Elev Sta | Elev |
| 0 | 117.67 18 | 114.25 42 | 108.93 52.99 | 105.62 66.99 | 103.55 |
| 86.99
194.99 | 103.4 93.99
106.71 236.99 | 102.95 103.99
106.1 277.99 | 104.87 116.99
106.06 315.99 | 106.05 153.99
106.28 366.99 | 106.27
106.23 |
| 396.99 | 106.71 230.99 | 106.27 476.99 | 106.06 315.99
106.09 518.99 | 106.08 559.98 | 105.84 |
| 679.98 | 105.84 720.98 | 106.1 760.98 | 106.03 795.98 | 106.47 808.97 | 101.39 |
| 841.97 | 101.57 865.97 | 101.09 881.97 | 101.08 922.97 | 101.35 969.97 | 101.05 |
| 990.66 | 101.86 1007.06 | 101.53 1069.38 | 101.9 1102.19 | 101.46 1167.79 | 101.91 |
| 1184.19 | 101.48 1239.96 | 101.9 1377.73 | 101.65 1505.66 | 101.97 1525.34 | 101.74 |
| 1600.79 | 102.06 1666.39 | 101.85 1774.64 | 102.01 1882.89 | 101.86 1948.5 | 102.13 |
| 2099.39 | 101.89 2217.48 | 102.26 2233.88 | 102.06 2283.09 | 102.76 2315.89 | 101.59 |
| 2460.22 | 101.81 2670.16 | 101.6 2683.28 | 101.81 2771.85 | 101.69 2906.34 | 101.87 |
| 2978.5 | 101.77 3040.83 | 102.03 3073.63 | 101.82 3175.32 | 102.48 3349.17 | 102.38 |
| 3552.55
4001.95 | 102.56 3647.68
102.4 4047.87 | 102.43 3713.28
103.57 4060.99 | 102.68 3729.68 | 102.44 3910.1 | 102.64 |
| 4362.78 | 103.42 4553.03 | 103.54 4598.96 | 102.92 4080.67
103.34 4635.04 | 103.41 4267.65
104.18 4671.12 | 103.25 |
| 4680.96 | 103.12 1333.03 | 102.69 4841.7 | 102.95 4884.34 | 103.5 4956.51 | 103.16 |
| 4979.47 | 103.52 5022.11 | 103.12 5094.28 | 103.1 5153.32 | 103.45 5173 | 103.10 |
| 5235.33 | 103.24 5353.42 | 103.03 5474.79 | 103.25 5510.87 | 102.99 5533.83 | 103.55 |
| 5625.68 | 103.12 5645.36 | 105.9 5658.48 | 102.03 5668.32 | 100.97 5704.41 | 99.79 |
| 5894.66 | 99.68 5917.62 | 100.22 5934.03 | 99.58 5947.15 | 94.86 5966.83 | 80.99 |
| 5976.67 | 79.46 6150.52 | 79.46 6206.29 | 84.9 6225.97 | 91.3 6232.53 | 92.17 |
| 6252.21 | 91.24 6271.89 | 94.82 6291.57 | 97.2 6317.82 | 97.89 6340.78 | 97.7 |
| 6357.18 | 99.54 6383.42 | 100.54 6426.07 | 97.35 6465.43 | 98.33 6478.55 | 99.27 |
| 6504.79 | 99.16 6524.47 | 100.55 6576.96 | 102.37 6606.48 | 105.29 6636 | 105.43 |
| 6665.52
6800.02 | 103.21 6675.37
100.25 6868.9 | 104.43 6701.61
99.69 6908.26 | 102.74 6718.01
99.77 6950.91 | 99.43 6754.09
100.68 6993.55 | 100.25
99.02 |
| 7042.76 | 99.42 7072.28 | 101.88 7098.52 | 103.34 7134.6 | 104.51 7167.41 | 104.98 |
| 7213.33 | 104.59 7285.5 | 104.88 7311.74 | 102.88 7351.1 | 103.04 7370.78 | 102.41 |
| 7400.3 | 104 7423.27 | 103.46 7456.07 | 104.26 7505.28 | 103.27 7554.48 | 103.84 |
| 7574.16 | 101.82 7590.57 | 101.66 7623.37 | 104.75 7682.42 | 104.06 7688.98 | 104.73 |
| 7721.78 | 105.11 7751.31 | 104.18 7800.51 | 103.89 7813.64 | 104.22 7853 | 103.81 |
| 7862.84 | 104.38 7915.33 | 105.51 7954.69 | 105.55 7994.06 | 106.58 8013.74 | 105.89 |
| 8039.99 | 107.13 8092.47 | 107.69 8099.03 | 106.99 8135.12 | 107.13 8187.61 | 108.94 |
| 8243.37 | 110.42 8269.61 | 111.7 8286.01 | 113.77 8345.06 | 118.1 8368.02 | 117.6 |
| 8381.14 | 116.5 8430.35 | 116.25 8472.99 | 113.52 8515.63 | 106.9 8555 | 103.91 |
| 8594.36 | 102.48 8610.76 | 102.77 8640.28 | 101.88 8679.65 | 102.75 8725.57 | 101.34 |
| 8755.09
8922.39 | 101.65 8778.05
100.42 8945.35 | 101.18 8801.02
101.44 8974.87 | 101.7 8830.54 | 100.9 8856.78
106.69 9092.96 | 101.4 |
| 9119.2 | 100.42 8945.35 | 107.05 9184.81 | 105 9017.51
107.32 9243.85 | 106.69 9092.96 | 105.9
108.39 |
| 9316.02 | 108.47 9368.5 | 109.38 9443.95 | 109.09 9539.08 | 108.1 9558.76 | 101.79 |
| 9578.44 | 103.29 9588.28 | 106.9 9601.4 | 109.28 9667.01 | 109.58 9673.57 | 110.18 |
| 9709.65 | 108.27 9745.74 | 107.92 9758.86 | 105.38 9771.98 | 106.45 9811.34 | 104.34 |
| 9824.46 | 105.01 9834.3 | 103.43 9860.54 | 93.7 9873.67 | 91.2 9880.23 | 87.41 |
| 9899.91 | 78.92 9903.19 | 78.71 9916.19 | 73.66 9926.19 | 72.06 9936.19 | 71.66 |
| 9956.19 | 72.06 9986.19 | 74.3610006.19 | 73.6610016.19 | 75.6610066.19 | 76.66 |
| 10096.19 | 77.3610106.19 | 78.3310132.81 | 78.6810162.33 | 88.9310168.89 | 92.77 |
| 10178.73 | 101.5710195.13 | 100.8610247.62 | 100.4810306.66 | 101.510336.18 | 101.35 |
| 10346.03 | 100.4710362.43 | 101.5810368.99 | 103.6810388.67 | 113.6210398.51 | 114.77 |
| 10405.07 | 110.3710411.63 | 108.8110470.68 | 106.110493.64 | 104.0110510.04 | 104.15 |
| 10562.52
10805.26 | 103.1710595.33
101.2810870.87 | 102.9410680.61
100.6310880.71 | 101.6610739.66
100.24 11015.2 | 101.59 10749.5
100.1811038.16 | 101.26
100.72 |
| 11090.65 | 100.1711103.77 | 100.5310000.71 | 100.1511244.82 | 101.8711261.22 | 105.32 |
| 11280.9 | 106.3111290.74 | 108.4111307.15 | 108.9811323.55 | 108.3811382.59 | 108.34 |
| 11395.71 | 106.7611435.08 | 105.2811477.72 | 105.0811503.96 | 105.6511520.36 | 107.48 |
| 11543.33 | 106.1511549.89 | 108.1811559.73 | 106.3511572.85 | 106.1911595.81 | 108.03 |
| 11618.77 | 107.0711667.98 | 106.5211700.78 | 105.2711720.46 | 105.4911766.38 | 103.13 |
| 11812.31 | 102.2411845.11 | 102.5811900.88 | 101.25 11963.2 | 101.0911992.72 | 101.8 |
| 12009.12 | 103.812068.17 | 104.6212251.86 | 104.2712284.67 | 103.9412402.76 | 103.89 |
| 12448.68 | 104.4612491.32 | 103.5412524.13 | 104.3412550.37 | 101.8612556.93 | 100.35 |
| 12589.73 | 99.36 12629.1 | 100.4612704.54 | 100.8612766.87 | 102.6112776.71 | 105.63 |
| 12937.44
13183.46 | 106.3912963.68
106.2813212.98 | 105.8213006.33
105.1813242.51 | 105.7713026.01
105.513262.19 | 106.2113071.93
104.7313314.67 | 105.61
105.58 |
| 13337.63 | 105.1513383.56 | 105.2313419.64 | 106.113445.88 | 105.2613586.94 | 105.19 |
| 13629.58 | 105.5213767.35 | 105.3413800.15 | 106.3713836.24 | 105.313852.64 | 105.55 |
| 13964.17 | 105.6814062.58 | 105.55 14174.1 | 105.6114220.03 | 105.8714347.96 | 105.8 |
| 14367.64 | 106.4214387.32 | 105.3214443.09 | 106.1614479.17 | 104.814489.01 | 103.66 |
| 14518.53 | 104.7114544.78 | 103.7714584.14 | 103.8814600.54 | 98.1414613.66 | 95.06 |
| 14633.34 | 94.5314659.58 | 96.0614682.55 | 101.9114702.23 | 105.4214725.19 | 107.59 |
| 14751.43 | 105.65 14823.6 | 106.7414859.68 | 106.0814951.53 | 106.5314974.49 | 104.58 |
| 15007.29
15190.99 | 104.9815059.78
105.0615200.83 | 104.4315108.98
103.5915210.67 | 105.1915148.35
10515299.24 | 103.7215158.19
104.7915315.64 | 104.55
106.26 |
| 15335.32 | 105.1715476.37 | 104.8715551.82 | 105.3315627.27 | 105.3815686.31 | 106.20 |
| 15781.44 | 106.0115886.41 | 105.5516040.58 | 105.8716296.44 | 105.9616306.28 | 106.3 |
| 16355.49 | 105.8716371.89 | 106.3616460.45 | 106.0216519.49 | 106.2116598.22 | 105.48 |
| 16667.1 | 105.8816693.34 | 106.6216703.18 | 108.07 16716.3 | 113.7416739.26 | 114.52 |
| 16749.1 | 111.5816775.34 | 108.2616811.43 | 107.4516837.67 | 108.1816863.91 | 107.57 |
| 16896.71 | 107.9616916.39 | 107.3116929.51 | 108.1316959.03 | 107.0917018.08 | 107.2 |
| 17037.76 | 108.0717067.28 | 107.6117116.48 | 108.6617152.56 | 10717185.36 | 106.89 |
| 17201.76 | 107.617237.85 | 107.2917293.61 | 108.0817310.01 | 106.9917336.25 | 106.88 |
| 17355.93
17578.98 | 107.6317411.69 | 106.2717424.81 | 106.6917474.01 | 106.1717503.54
106.8317795.47 | 106.6 |
| | 105.9917687.22 | 106.34 17739.7 | 105.9517752.82 | | 105.87 |
| 17847.95
17966.03 | 105.9817893.87
105.4917972.59 | 107.117903.71
106.1518018.51 | 106.2417920.11
106.818100.52 | 106.9717936.51
106.33 18136.6 | 105.5
107.32 |
| 18189.08 | 105.4917972.39 | 105.1718323.56 | 107.1218333.41 | 107.9318369.49 | 107.32 |
| 18418.69 | 106.3818461.33 | 107.0918546.62 | 106.2918592.54 | 106.41 18648.3 | 105.49 |
| 18704.06 | 105.6818759.82 | 105.0218792.62 | 105.4318864.79 | 105.4318913.99 | 106.71 |
| 18933.67 | 106.6118956.63 | 105.2918995.99 | 105.5519018.95 | 105.1819051.76 | 106.59 |
| 19133.76 | 106.34 19160 | 105.3319245.28 | 106.15 19274.8 | 104.8219320.73 | 105.16 |
| 19333.85 | 106.0919376.49 | 105.319399.45 | 106.419428.97 | 106.6619461.77 | 105.67 |
| 19481.45 | 106.319520.81 | 106.3919543.77 | 105.8519612.66 | 10619619.21 | 106.84 |
| 19668.42 | 108.0619707.78 | 106.61 19737.3 | 107.11 19753.7 | 110.7719763.54 | 110.54 |
| 19773.38
19901.3 | 107.24 19802.9
111.1719947.22 | 106.419838.98
125.0519953.79 | 107.9819858.66
125.6820045.63 | 107.9919875.06
123.8220071.87 | 109.95
122.87 |
| 20157.15 | 124.2120206.36 | 123.48 20265.4 | 123.0720275.24 | 119.4720294.92 | 118.76 |
| 20340.84 | 114.9320367.08 | 115.5520386.77 | 105.06 20413 | 98.5320429.41 | 90.22 |
| | | | | | |
| | | | | | |

```
Printed at 13:42 on 03 Oct 2017
                                                        n Val
               .108 9834.3
                                     .066 9860.54
                                                           .01510178.73
                                                                                  .06610398.51
                                   Lengths: Left Channel
                                                                                 Coeff Contr.
Bank Sta: Left
                      Right.
                                                                   Right.
                                                                                                      Expan.
                                               2822 2844
Elevation=
                                                                  2893
117.67
           9834.310178.73
Left Levee Station=
Right Levee Station=1
Blocked Obstructions
                     Station=16739.26
                                                   Elevation=
                                num=
   Sta L Sta R Elev
0 9119.2 106.05
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                   115.27
                                                   Element
                                                                                      Left OB
                                                                                                     Channel
                                                                                                                   Right OB
                                                                                        0.108
  Vel Head (ft)
                                                   Wt. n-Val.
                                                                                                       0.021
                                        0.20
                                                                                                                      0.138
                                   115.07
                                                   Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                    2893.00
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                     2822.00
                                                                                                    2844.00
  Q Total (cfs) 130000.00
Top Width (ft) 19824.66
Vel Total (ffs) 0.67
                                                   Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                    84570.34
                                                                                                   12042.34
                                                                                                                   96324.63
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                      9675.63
                                                                                                      344.43
                                                                                                                    9804.60
                                                                                         0.41
                                                                                                         5 18
                                   43.41
                                                                                                       34.96
                                  18617380.0
2853.35
  Conv. Total (cfs)
Length Wtd. (ft)
                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                                                        4737834.0
                                                                                       4940534.0
                                                                                                        8939013.0
                                                                                                      356.77
                                     71.66
                                                                                      0.03
                                                                                                      0.10
                                                   Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
                                                                                                                        0.03
  Alpha
  Frctn Loss (ft)
                                        0.13
                                                   Cum Volume (acre-ft)
Cum SA (acres)
                                                                                    158176.20
                                                                                                     58417.61
                                                                                                                   189244.10
  C & E Loss (ft)
                                                                                    20273.15
                                                                                                     2483.01
                                                                                                                  22964.68
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
           Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                   RS: 160
Description: New Cross-Section, Updated on left with new survey to Station
                 508.98, Bathymetric elevations translated from New Cross-Section
                 161.3
Station Elevation Data
                                   num=
                                  Elev
117.76
101.38
      Sta
                        Sta
                                                                                             30 110.74
72 100.19
                                                       117.82
101.35
                                                                        29 117.61
62 100.78
            117.61
                          4
32
                                                 22
        0
   87.99
                         96.99
                                             104.99
                                                                  113.99
                                                                                97.09 137.99
                                   98.59
               99.4
                                                          98.06
                                                                                                      95.15
             95.15 157.99
105.56 223.98
                                   96.7
105.83
                                             168.99
247.98
                                                        98.07 181.99
105.75 305.98
                                                                              100.81 201.99
105.87 342.97
  139.99
                                                                                                    105 29
  216.98
                       426.97
537.98
698.72
                                                                   503.96
577.34
724.96
             105 77
                                    105 9
                                             466.96
                                                         105 75
                                                                               105 45
                                                                                          508 96
                                             715.12
  656.07
             102.22
                                    102.8
                                                        106.22
                                                                               105.27
                                                                                         741.36
                       767.6
928.34
                                                                                92.21 866.01
92.76 1066.12
                                              780.73
                                                         92.03
  892.26
                                    92.79 954.58
92.75 1187.49
94.35 1522.09
              92.46
                                                           92.4
                                                                    977.55
 1092.36
              93.02 1115.32
94.12 1492.56
                                                          94.22 1230.13
94.62 1613.94
                                                                                93.84 1292.46
94.52 1659.86
 1331.83
             94.65 1774.67
98.75 1961.65
102.55 2102.71
                                    94.94 1784.51
                                                          95.35 1797.64
98.88 2043.66
                                                                               98.95 1823.88
100.32 2050.22
 1705 79
                                    98.62 2027.26
 1876.36
                                                                              102 2329.06
101.7 2909.7
102.01 3283.67
 2092.87
                                   101.91 2165.04
                                                         101.77 2227.37
                                                                                                      101.7
             102.02 2519.33
101.95 3073.72
                                   101.92 2785.04
102.18 3142.61
                                                         101.83 2890.02
102.01 3254.15
 2440.6
3037.64
                                                                                                     101.46
                                                                              100.8 3487.06
102.53 3880.71
102.44 4668
104.64 4920.6
             102.24 3342.72
100.87 3723.25
                                   100.88 3391.93
101.22 3772.46
                                                         101.24 3447.69
100.71 3798.7
 3306.63
 3710.13
             102.53 4110.34
102.73 4759.86
104.67 4973.08
                                   102.33 4244.83
103.35 4792.66
105.04 4992.77
                                                         102.56 4595.84
105.08 4904.19
 3962.72
```

105.2 5045.25 104.57 5222.4 104.96 5360.17

99.68 5688.22 101.69 5963.77

101.23 6573.93 100.11 6777.31

91 92 6915 09

98.88 7072.55 101.26 7141.44

99.73 7252.98 78.25 7341.58

75.2 7461.58 78.28 7574.46

107.23 7685.99 105.27 7869.69

102.46 8046.84 102.7 8197.74 103.28 8404.39

103.14 8614.33 102.41 8912.84

100.8 9230.97 100.57 9434.29 102.41 9647.44 104.99 9817.97 104.310168.85

103.9110680.42 103.7711060.82

104.311470.73

104.3211651.09

104.2312015.13

103.0612343.12

106.1212726.89 104.5512913.86

104.92 13153.3

105.2713710.91

104.1714117.64

105.2614622.77

95.49 14206.2 98.55 106.514363.64 106.01

104.55

90 98

75.9

103.63

100 57

103.89

105 61

104.46 5022.29

104.99 5192.87 104.47 5347.05

99.84 5576.68 99.97 5927.69

101.49 6462.39 101.78 6744.51

95 46 6905 25

96.03 7043.03 99.97 7121.76

98.91 7216.89 79.44 7318.58

73.2 7431.58 77.87 7564.62

106.49 7646.63 106.42 7804.09

104.08 8020.59

103.91 8155.09 104.14 8391.27

103.38 8601.21 103.05 8889.87

101.54 9116.2 101.44 9388.38 99.92 9621.21

104.58 9778.62 103.9310119.66

104.2210513.18 104.22 10985.4

104.111457.62

104.1311615.02

103.9911883.92

103.9812179.13 102.7512333.28

105.4212680.97

104.9213094.27 105.4613277.94

105.3113576.43 105.5313947.07

103.3414097.96

94.7714193.08 106.17 14337.4

106.3314521.09 106.5814547.33 105.6114740.85 105.3414767.09

105.04 4992.77 104.61 5173.19 104.98 5333.93 100.07 5422.5 99.7 5894.88 101.27 6363.98 101.46 6724.83 97.95 6888.85

92.79 7020.07 101.66 7115.2

101.66 7115.2 101.52 7197.21 88.78 7298.9

73.9 7421.58 76.9 7521.58

102.73 7633.5 106.77 7781.12

104.26 8014.03 102.67 8122.29 103.67 8358.47

103.66 8479.84 102.86 8735.7

102.86 8/35./ 101.36 9050.61 100.74 9345.75 99.6 9581.86 105.13 9745.82 104.4310063.91

103.8410359.05 103.9110932.93

104.311316.61

104.4611519.92

103.8811870.81

104.2612129.93

105.7312641.62 104.8612812.17

104.8612812.17 105.4713022.11 10513241.86 105.1513491.15 105.713937.23 103.9614081.56

94.9214183.24 106.4114314.44

4940.28

5074.78 5242.08

5383.14 5724.3

6085.15 6593.61 6852 76

7088.95

7164.4 7262.82

7371.58

7471.58

7594 14

7882.82

8312.55 8437.2

8968.6

9483.48

9857.32

10244.28

11218.23

11487.13 11680.61

12241.45

12395.61 12776.09

12936.82

13376 34

14015.96

14442.36

14140.6 14219.32 104.91 5117.42 104.47 5304.41

101.65 5396.26 99.66 5878.48

101.48 6281.97 101.45 6685.46 99.17 6872.45

99.17 6872.45 90.12 7000.38 100.58 7102.08 101.76 7174.25 93.06 7275.94

71.6 7401.58 75.5 7511.58

94.16 7617.1 108.03 7754.88 104.97 7932.02

101.51 8092.76 104.42 8342.07

102.89 8447.04 103.29 8702.9

101.83 9027.65 100.3 9329.35 100.45 9529.39 105.66 9735.98 104.14 9962.26

104.2110322.98 103.7810860.78

103.8911241.18

105.8411500.25

104.0711782.27

103.6812106.97 105.0512303.76

105.2812582.58 105.6912802.33

105.0313008.99

106.47 13399.3 105.513819.15 105.5914055.32

96.0114150.44

14485

104.6514258.68

104.8114717.89

105.4

```
14947.49 104.1515167.26 105.3215216.46 105.0815245.98
                                                                                   105.5615334.54 106.08
15508.38
               105.7 15554.3
                                     105.8815596.95
                                                            105.6415642.87
10616059.43
                                                                                   106.0815731.43
105.8416167.68
                                                                                                          105.81
                                                            106.8416292.32
 16213.6
              105.1216259.52
                                     105.9516275.92
                                                                                   112.6816308.72
                                                            107.616397.27
107.8116531.72
16325.12
              113.4216334.96
                                     109.7116367.75
                                                                                   107.1916449.74
16462.86
              108.4716492.37
                                     109.0716521.88
                                                                                    108.216554.68
16571.07
16751.44
             107.4616594.03
107.9616771.11
                                    105.3816616.98
108.8316790.79
                                                            105.5716633.38
106.8416826.86
                                                                                   107.8116698.97
106.6616839.98
16849.81
              106.116882.61
106.7517043.29
                                     106.1616892.45
                                                            107.0116928.52
                                                                                   106.9516958.03
106.1617171.19
                                     106.3317059.69
                                                            106.8117148.23
                                                           108.1817308.92
107.0617417.13
106.0717567.98
17207.26
              106.0117256.45
                                     107.8217276.12
                                                                                    107.217335.15
             106.0117256.45
105.82 17390.9
106.4417499.12
106.2517653.24
107.7417777.86
                                                                                   107.217333.13
106.5717456.48
105.3817607.33
107.0317722.11
                                     106.3317397.46
106.9517561.42
 17469.6
                                    105.7217689.31
106.89 17833.6
17627.01
                                                            105.9317708.99
17748.34
                                                            107.4117876.23
                                                                                   106.5817895.91
                                                                                                          105.17
             106.18 17945.1
106.4618282.87
105.4818443.55
106.4118581.28
 17928.7
                                    106.0417994.29
105.4718322.22
                                                            107.0918027.08
                                                                                   106.67 18118.9
106.6618358.29
                                                            105.3818338.62
18223.84
                                                           106.4318486.18
105.2118679.66
105.718889.54
                                                                                   105.6918522.26
107.4718702.62
18417.32
                                     105.1318459.95
                                                                                                          105.78
                                     104.9518614.08
18797.72
              104.9118830.51
                                     105.0118840.35
                                                                                   106.3818919.05
                                                                                                          105.64
             105.4219010.87
104.8819132.21
                                    105.6719037.11
105.8119138.76
                                                          106.2319063.34
104.79 19165
                                                                                  105.89 19069.9
105.8519220.75
 18958.4
19115.81
                                                           104.79 19165
106.519325.68
107.07 19417.5
19243.7
19371.59
             106.319276.49
110.7519381.43
                                     105.919289.61
110.4219391.27
                                                                                   106.4 19355.2
106.2719443.74
                                                           110.6419535.56
125.7119637.22
122.5819847.09
19466.69
               107.519489.65
                                     110.21 19512.6
                                                                                   113.37 19545.4
                                                                                                           121.2
19683.13
              122.01 19719.2
                                     122.6819801.18
                                                                                   123.2719866.77
19883.16 121.54 19893
20001.22 107.3220014.34
                                    118.76 19909.4 116.7419948.75
101.1320030.73 97.6520043.85
                                                                                   115.41 19988.1
90.2820217.65
20224.21
               92.1520230.77
                                      97.1520253.72 108.17 20273.4
                                                                                   108 65
Manning's n Values
     Sta n Val Sta
0 .108 7252.98
985.4 .144
                             Sta n Val
                                                             n Val
                                       .066 7318.58
                                                                                      .07 7633.5
                                                              .015 7564.62
                                                                                                             .066
 10985.4
                                    Lengths: Left Channel Right 4690.55 4824.53 1212.75
Bank Sta: Left Right 7252.98 7617.1
                                                                                      Coeff Contr.
                                                                                                            Expan.
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
  Sta L Sta R
7617.1 20273.4
                        102.73
                      4 102.73 T
Station= 22
Station=16308.72
                                                   Elevation= 117.82
Left Levee
Right Levee
                                                  Elevation= 117.82
114.56
Blocked Obstructions num=
Sta L Sta R Elev
0 7164.4 101.76
CROSS SECTION OUTPUT Profile #Design Flow
                                    115.10
  E.G. Elev (ft)
                                                                                           Left OB
                                                                                                          Channel
                                                      Element
                                                                                                                         Right OB
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                       0.03
115.06
                                                      Wt. n-Val.
Reach Len. (ft)
                                                                                          0.108
4690.55
                                                                                                          0.037
4824.53
                                                     Flow Area (sq ft)
Area (sq ft)
                                         94 33
                                                                                         91915 71
                                                                                                        13043.80
                                                                                                                        121650 30
                                                                                          43501.14
  O Total (cfs)
                                     130000.00
                                                       Flow (cfs)
                                                                                                          34930.71
                                                                                                                          51568.14
  Top Width (ft)
Vel Total (ft/s)
                                                     Top Width (ft)
                                          0.57
                                                      Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                             0.47
                                                                                                             2.68
                                                                                                                              0.42
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                         43 46
                                                                                                            35.82
5527165.0
                                     20570190.0
                                                     Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                            6883283.0
                                                                                                                              8159743.0
                                      3059.57
                                                                                          7238.33
                                                                                                           374.93
                                                                                                                        12243 75
                                                                                          0.03
                                                                                                           0.09
  Min Ch El (ft)
                                                                                                                              0.02
  Alpha
                                          6.30
                                                                                              0.01
                                                                                                              0.23
                                                                                                                              0.01
                                                     Cum Volume (acre-ft)
Cum SA (acres)
                                                                                        152459.50
19725.75
                                                                                                          57598.68
                                                                                                                        22233.43
  C & E Loss (ft)
                                                                                                          2459.88
                                          0.00
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.
            Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used
Note:
CROSS SECTION
RIVER: Rio Grande
                                    RS: 159
REACH: Lower Reach
Description: New Cross-Section, Bathymetric elevations translated from New
                  Cross-Section 161.3
Station Elevation Data
                                    num=
                                                  460
     Sta
0
                Elev Sta
17.77 13.11
                                     Sta
19.67
96.32 137.7
93.45 668 01
                                                          107.37 72.13 105.63 91.8
94.78 167.21 93.48 206.55
94.3 685.23 94.12 803.26
             117.77
                                    117.75
                                                                                                           94.99
93.28
               92.2 118.03
93.59 314.75
   108.19
                                                                                                            94.49
  298.35
  829.49
               94.37 970.47
99.3 1118.01
                                     94.83 1049.16
101.72 1134.4
                                                            94.9 1072.11
103.67 1147.52
                                                                                    95.79 1085.23
 1108.18
                                                                                   101.68 1154.08
              106.72 1196.7
100.48 1255.71
                                     109.88 1203.25
92.09 1285.22
                                                            108.15 1213.09
82.59 1295.06
                                                                                   102.47 1229.48
77.69 1295.06
                                                                                                          100.62
 1163 91
                                       71.38 1348.06
 1308.06
               72.98 1318.06
                                                             71.38 1378.06
                                                                                     73.68 1398.06
                                                                                                            72.98
 1408.06
                                      75.68 1445.87
89.84 1508.16
                                                             77.69 1455.71
90.51 1527.83
                                                                                    80.27 1472.1
96.12 1544.23
               86.64 1498.33
 1485.21
                                                                                                            98.88
               98.45 1593.41
93.63 1701.6
94.44 1809.79
 1570.46
                                      97.36 1613.08
92.3 1711.44
                                                             95.63 1622.91
93.28 1727.83
                                                                                    94.07 1662.26
92.97 1754.06
 1681.93
                                      95.53 1819.63
97.57 1954.05
 1780.29
                                                             94.79 1849.14
                                                                                    95.29 1858.97
                                                                                                            96.59
               96.38 1917.99
                                                               97.9 1967.17
  1885.2
                                                                                   100.02
                                                                                   102.28 2196.67
 2016.34
              100.78 2085.2
                                     101.25 2098.31
                                                            101.72 2173.72
              102.32 2275.36
                                     102.03 2288.48
101.25 2658.97
                                                            101.34 2337.66
102.21 2681.92
                                                                                   101.3 2439.3
101.95 2721.26
 2449.13
              102.13 2626.18
  2731.1
              101.85 2836.06
101.89 3059.1
                                     102.38 2901.66
101.08 3150.94
                                                            101.96 2950.86
101.63 3180.46
                                                                                   101.92 2986.94
102.23 3223.1
  3016.46
                                     101.85 3380.54
102.14 3646.22
                                                            102.84 3390.38
102.74 3669.18
 3282.14
              102.41 3357.58
                                                                                   102.18 3423.18
              102.58 3639.66
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102.23 4010.31 102.66 4138.23 105.47 4282.56

105.51 4472.81 104.56 4758.18 101 29 4049 67

102.38 4167.75 104.74 4315.36

106.18 4489.21 104.27 103.62 4790.98 104.53

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104.99 4430.16 104.54 4692.58

104.02 4882.83 104.02 5125.56 101.85 3954.55 101.02 4111.99

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                                             Lengths: Left Channel Right 11213.4411093.096165.786
Bank Sta: Left Right 1245.88 1544.23
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Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1544.2317913.15 98.88 T
                                                                 Elevation= 117.77
Elevation= 114.88
Left Levee
                           Station=
                       Station=13927.17
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                                                  Element
                                                                                                               Left OB
                                                                                                                                 Channel
                                                                                                                                                    Right OB
                                                                 Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                                            0.107
11213.44
                                                                                                                               0.045
11093.09
   Vel Head (ft)
                                                   0.05
   W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                                                                              10110.45
10110.45
                                                 100 41
                                                                                                            23140 65
                                                                                                                                                  140369 80
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   O Total (cfs)
                                             130000.00
                                                                   Flow (cfs)
                                                                                                             22706.03
                                                                                                                                                    73029.31
   Top Width (ft)
Vel Total (ft/s)
                                                                 Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                            13911.77
                                                                                                              1230.94
                                                                                                                                  298.35
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                                                                                                                                      3.39
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                                               43.48
                                                                                                               18.80
   Max Chl Dpth (ft)
Conv. Total (cfs)
                                                                                                                                    33.89
                                                                                                                                                        11.34
                                                                                                                2270869.0
                                                                                                                                     3426868.0
   Length Wtd. (ft)
                                              9475.66
                                                                                                              1242.84
                                                                                                                                  309.01
                                                                                                                                                 12396.85
   Min Ch El (ft)
                                                                                                                                     0.20
                                                  71.38
                                                                                                                  0.12
                                                                  Stream Power (lb/ft s)
   Alpha
                                                    5.97
                                                                                                                   0.11
                                                                                                                                      0.69
                                                                                                                                                          0.04
                                                                                                            146264.80
   Frctn Loss (ft)
C & E Loss (ft)
                                                                                                                                 56316.45
2423.19
                                                                  Cum Volume (acre-ft)
                                                                                                                                                    178107.20
                                                                                                                                                 21891.01
                                                                  Cum SA (acres)
                                                    0.00
                                                                                                            19270.55
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                             RS: 157 2
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INPUT
Description: New Cross-Section, Bathymetric elevations translated from USIBWC XS 115.15
Station Elevation Data num= 460
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

Right OB 0.078 5284.79 15520.92 15520.92

Channel 0.047 4252.55 9633.44 9633.44

| 2212.34 100.43 2148.58 2273.23 99.14 2306.03 2558.61 99.28 2581.57 2739.02 98.81 2824.31 2948.95 101.05 2971.92 3112.97 101.31 3178.57 3326.18 99.29 3362.26 3454.11 99.19 3509.87 3746.05 98.73 3755.89 3854.29 98.67 3919.9 4057.67 98.75 4070.79 4188.88 98.9 4395.53 4585.78 99.81 4648.11 4776.04 100.04 4815.4 4979.41 99.53 4995.81 5346.8 546. | 106.1710836.39
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90.2211744.76 | 104.54 9.84 100.81 111.53 101.94 252.58 1001.28 396.91 103.54 482.2 102.85 5511.09 102.6 662.62 103.62 751.19 103.3 823.35 104.76 970.97 98.79 1056.25 97.63 1223.55 97.71 1430.2 99.23 1863.2 100.2 1997.69 101.01 2089.54 100.16 2207.63 99.12 2384.76 99.13 2686.54 98.72 2906.31 101.12 3040.8 101.02 3244.17 99.31 3401.62 99.13 3595.16 98.54 3801.81 98.55 4123.27 99.03 4336.49 98.92 4493.94 99.73 4700.59 100.24 4910.53 98.61 5035.18 95.54 5094.22 99.73 364.69 98.92 4493.94 99.73 4700.59 100.24 4910.53 98.61 5035.18 95.54 5094.22 99.73 4700.59 100.24 4910.53 98.61 5035.18 95.54 5094.22 99.73 528.71 98.06 5304.16 94.13 5386.16 93.39 5458.33 96.84 5537.05 99.73 4700.59 100.24 4910.53 98.61 5035.18 95.54 5094.22 99.73 528.71 98.06 5304.16 94.13 5386.16 94.13 5386.16 94.13 5386.16 106.38 6252.05 103.84 6334.03 103.58 6570.13 104.33 6750.48 105.3 5950.37 106 6061.86 106.38 6252.05 103.38 4 6334.03 103.58 6570.13 104.33 6750.48 105.3 5950.37 106 6061.86 106.38 6252.05 103.38 4 6334.03 103.58 6570.13 104.33 6750.48 105.3 7780.11 106.86 7875.21 109.63 7780.11 106.86 7875.21 107.65 8026.05 107.03 8180.16 106.04 9342.45 106.71 8435.95 106.64 8759.21 107.65 8026.05 107.03 8180.16 106.04 9342.45 106.69 9784.43 105.79 880.13 105.79 880.13 105.79 880.23 105.77 880.33 105.73 8914.84 106.69 9784.43 105.99 9432.85 105.79 8923.24 107.0510849.51 109.66110238.75 100.68 10033.79 100.68 10033.7 | 101.68 13.12 100.6 144.33 101.2 278.82 101.63 416.66 103.05 492.04 102.34 587.17 103.18 675.74 103.19 774.15 104.06 843.03 101.51 987.37 97.28 1121.865 98.12 1246.51 98.1449.89 98.12 1646.7 99.14 1896 100 2007.53 100.48 2115.78 99.28 2256.83 99.31 2453.64 98.77 2716.06 99.1 2925.99 100.87 3103.12 101.62 3293.38 99.65 3414.75 98.86 3673.88 98.83 3824.77 98.81 4346.33 99.65 3414.75 98.86 3673.88 98.83 3824.77 98.81 4346.33 99.46 5387.47 98.77 2716.66 100.16 4720.27 99.23 4936.77 98.81 4346.39 99.45 5251.67 95.83 5310.72 94.17 5396 93.74 5471.45 97.05 5576.42 99.23 4936.77 70.9 5835.47 94.57 5894.6 105.81 5966.77 105.22 6094.66 105.72 6268.45 104.72 6363.54 104.72 6363.54 104.69 6845.57 105.86 7065.27 105.86 7065.27 105.86 7065.27 105.87 72448.9 106.26 7386.62 104.74 7527.62 104.74 7527.62 105.51 7694.86 104.69 6845.57 105.86 7065.27 105.87 72448.9 106.26 7386.62 104.74 7527.62 105.51 7694.86 107.24 7786.67 106.51 7921.11 106.35 8045.72 105.96 821.51 106.18 834.29 107.51 8452.34 105.27 8554 103.74 67744.04 107.24 7786.67 106.51 7921.11 106.35 8045.72 105.96 821.51 106.18 8344.29 107.51 8452.34 105.27 8554 103.74 67744.06 110.72 7786.67 105.26 9105.07 104.5810180.53 104.910744.57 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.4110872.47 106.411111.85 119.4411111.85 119.4411111.85 119.4411111.85 119.4411111.85 119.4411111.85 119.4411111.85 119.4411111.85 119.4411111.85 | 101.41
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n Val Sta | n Val Sta | n Val Sta | n Val |
| | | | | |
| 5596.1 5894.6 Left Levee Station= Right Levee Station= Blocked Obstructions Sta L Sta R Elev 895.01 5590.36 98.47 CROSS SECTION OUTPUT Pro | num= 1 | | Coeff Contr1 | . 3 |
| E.G. Elev (ft) Vel Head (ft) W.S. Elev (ft) Crit W.S. (ft) E.G. Slope (ft/ft) | 113.78 Ele
0.07 Wt.
113.71 Rea
102.89 Flo
0.000144 Are | ment n-Val. ich Len. (ft) w Area (sq ft) ia (sq ft) | Left OB
0.102
936.61
78153.56
78153.56 | Channe
0.047
4252.55
9633.44
9633.44 |

| Q Total (cfs) | 130000.00 | Flow (cfs) | 79282.30 | 35908.45 | 14809.25 |
|-------------------|------------|------------------------|-----------|----------|--------------|
| Top Width (ft) | 7714.54 | Top Width (ft) | 5593.75 | 298.50 | 1822.29 |
| Vel Total (ft/s) | 1.26 | Avg. Vel. (ft/s) | 1.01 | 3.73 | 0.95 |
| Max Chl Dpth (ft) | 44.81 | Hydr. Depth (ft) | 13.97 | 32.27 | 8.52 |
| Conv. Total (cfs) | 10817740.0 | Conv. (cfs) | 6597347.0 | 2988063 | .0 1232327.0 |
| Length Wtd. (ft) | 2857.31 | Wetted Per. (ft) | 5602.87 | 313.41 | 1824.13 |
| Min Ch El (ft) | 68.90 | Shear (lb/sq ft) | 0.13 | 0.28 | 0.08 |
| Alpha | 2.89 | Stream Power (lb/ft s) | 0.13 | 1.03 | 0.07 |
| Frctn Loss (ft) | 0.55 | Cum Volume (acre-ft) | 133227.00 | 53802.43 | 166886.80 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 18392.13 | 2347.20 | 20885.69 |

Note: Note:

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

| RIVER: Ri
REACH: Lo | | | RS: 15 | 7.15 | | | | | |
|------------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| INPUT | | | | | 11.6 | 7777 | 2022 0 | | |
| Descripti
Station E | Elevation | n Data | num= | 460 | | | | | |
| Sta
0 | Elev
99.7 | Sta
3.28 | Elev
100.09 | Sta
6.55 | Elev
100.21 | Sta
13.11 | Elev
101.93 | Sta
22.94 | Elev
105.1 |
| 29.5
62.27 | 107.09
116.32 | 36.05
85.21 | 108.98
116.53 | 45.88
88.49 | 112.15
113.57 | 55.72
91.77 | 115.11
105.88 | 58.99
95.05 | 115.87
101.42 |
| 98.32
144.21 | 101.32
100.62 | 114.71
150.76 | 101.2
100.47 | 121.27
163.87 | 101.1
100.63 | 131.1
173.7 | 100.81
100.94 | 140.93
180.26 | 100.91
101.28 |
| 193.37 | 100.87 | 199.92 | 100.83 | 209.76 | 100.66 | 216.31 | 100.88 | 222.87 | 100.83 |
| 235.98
288.42 | 100.91
100.84 | 242.53
294.97 | 100.75
100.81 | 265.47
304.8 | 100.79
101.1 | 275.31
311.36 | 100.91
100.95 | 281.86
317.91 | 100.71
100.9 |
| 331.02
376.91 | 100.94
101.82 | 337.58
386.74 | 101.01
101.82 | 347.41
393.29 | 100.91
101.3 | 360.52
399.85 | 101.21
101.41 | 370.35
409.68 | 101.31 |
| 412.96
458.84 | 101.64
102.5 | 422.79
468.67 | 101.98
102.72 | 432.62
475.23 | 102.09
102.38 | 435.9
478.51 | 102.32
102.39 | 449.01
485.06 | 102.69
102.61 |
| 491.62
527.67 | 102.44
102.44 | 501.45
534.22 | 102.29
102.72 | 508
544.06 | 102.38
102.55 | 514.56
563.72 | 102.33
102.35 | 521.11
570.28 | 102.51
102.68 |
| 576.83 | 102.61 | 583.39 | 102.64 | 589.94 | 102.81 | 596.5 | 102.75 | 606.33 | 102.78 |
| 612.88
652.21 | 102.65 | 625.99
662.05 | 102.52
102.95 | 632.55 | 102.75 | 639.1
675.16 | 102.56
103.14 | | 102.6 |
| 688.26
734.15 | 102.97
103.14 | 691.54
740.7 | 103.1
103.11 | 701.37
747.26 | 102.79
103.28 | 711.21
753.81 | 102.96
103.28 | 724.32
766.92 | 103.47
103.07 |
| 776.76
812.81 | 103.21
103.69 | 783.31
816.09 | 103.46
103.89 | 793.14
819.36 | 103.66
103.77 | 799.7
822.64 | 103.59
103.43 | 802.98
829.2 | 103.76
103.56 |
| 848.86
884.91 | 103.32
103.87 | 855.42
894.75 | 103.5
103.74 | 861.97
901.3 | 103.43
103.93 | 868.53
907.86 | 103.61
103.92 | 878.36
917.69 | 103.65
103.69 |
| 920.97 | 103.72 | 927.52 | 104.01 | 934.08 | 103.97 | 940.63 | 104.12 | 947.19 | 103.86 |
| 960.29
989.79 | 104.06
103.21 | 966.85
993.07 | 104.05
103.07 | 973.4
996.35 | 104.25
103.51 | 979.96
999.62 | | 983.24
1006.18 | 103.88
104.85 |
| 1009.46
1042.23 | | 1019.29
1045.51 | 98.1 | 1022.57
1048.79 | 97.68 | 1029.12
1052.06 | 97.68 | 1035.68
1055.34 | 101.04
97.91 |
| 1058.62
1094.67 | | 1065.17
1107.78 | | 1068.45
1114.34 | | 1075.01
1127.45 | 97.42
97.01 | 1081.56
1134 | 97.37
96.9 |
| 1143.83
1183.16 | | 1150.39
1192.99 | | 1153.66
1196.27 | | 1166.77
1199.55 | | 1176.61
1202.83 | 97.25
97.17 |
| 1212.66
1251.99 | 97.1 | 1219.21
1255.27 | | 1222.49 | 97.25 | 1235.6
1271.65 | 97.41 | 1242.16
1281.48 | 97.22
97.44 |
| 1288.04 | 97.41 | 1294.59 | 97.51 | 1307.7 | 97.6 | 1320.82 | 97.45 | 1330.66 | 97.54 |
| 1337.22
1383.14 | 99.46 | 1343.78 | 99.63 | 1353.62 | 99.58 | 1360.18 | | 1373.3
1412.66 | 99.55 |
| 1415.94
1452.02 | 99.19
99.56 | 1422.5
1458.58 | | 1432.34
1468.42 | | 1442.18
1478.25 | | 1448.74
1484.81 | 99.51
99.11 |
| 1497.93
1534.01 | | 1507.77
1547.13 | | 1514.33
1553.69 | | 1520.89
1560.25 | | 1527.45
1566.81 | 99.45
99.25 |
| 1576.65
1609.45 | | 1583.21
1616.01 | | 1589.77
1629.13 | | 1596.33
1642.25 | | 1602.89
1648.81 | 99.39
99.68 |
| 1655.37
1720.96 | | 1675.05
1730.8 | 99.34 | 1678.33
1737.36 | 99.44 | 1704.57
1740.64 | 99.29 | 1711.12
1750.48 | 99.31
99.19 |
| 1757.04 | 99.39 | 1763.6 | 99.27 | 1770.16 | 99.3 | 1776.72 | 99.18 | 1796.4 | 99.32 |
| 1802.96
1839.04 | 99.25 | 1809.52
1845.6 | 99.4 | 1816.08 | 99.34 | 1822.64
1865.28 | 99.36 | 1832.48 | 99.35 |
| 1894.8
1950.55 | | 1904.64
1953.83 | 99.28
99.13 | 1911.2
1960.39 | | 1917.76
1970.23 | | 1934.16
1986.63 | 99.15
98.96 |
| 1996.47
2035.83 | | 2003.03
2052.23 | | 2012.87
2058.79 | | 2019.43 2065.35 | | 2029.27 2068.63 | 99.17
99.1 |
| 2075.19
2130.95 | 99.22 | 2085.03
2144.07 | 99.09 | 2091.59
2150.63 | 99.19 | 2101.43
2163.74 | 99.22 | 2114.55
2173.58 | 99.01
99.02 |
| 2189.98
2242.46 | 98.75 | 2206.38
2249.02 | 98.67 | 2212.94 2255.58 | 98.78 | 2219.5 | | 2229.34 2268.7 | 98.53
98.36 |
| 2275.26 | 98.41 | 2281.82 | 98.24 | 2298.22 | 98.16 | 2258.86 | 98.89 | 2314.62 | 98.52 |
| 2324.46
2360.54 | 98.46 | 2331.02
2367.1 | 98.13 | 2340.86
2376.94 | | 2350.7
2386.78 | 97.95 | 2357.26
2393.33 | 98.48
97.82 |
| 2409.73
2449.09 | | 2419.57
2458.93 | | 2429.41
2468.77 | | 2435.97
2475.33 | | 2442.53
2481.89 | 97.75
97.63 |
| 2491.73
2537.65 | | 2508.13
2540.93 | | 2514.69
2547.49 | | 2521.25
2557.33 | | 2531.09
2563.89 | 97.49
97.55 |
| 2570.45
2609.81 | | 2580.29
2613.09 | | 2590.13
2619.65 | | 2596.69
2622.93 | 97.79 | 2603.25
2632.77 | 97.96
97.73 |
| 2649.16
2704.92 | 97.64 | 2662.28
2714.76 | 97.71 | 2675.4
2718.04 | | 2678.68
2724.6 | 97.77 | 2698.36
2731.16 | 97.71
97.67 |
| 2737.72 | 97.84 | 2744.28 | 98.12 | 2747.56 | 98.14 | 2754.12 | 97.92 | 2757.4 | 98.05 |
| 2763.96
2786.92 | 97.73 | 2770.52
2790.2 | 96 | 2777.08
2793.48 | 94.82 | 2780.36
2800.04 | 91.95 | 2783.64
2803.32 | 99.72
90.74 |
| 2806.6
2826.28 | | 2809.88
2829.56 | | 2813.16
2832.84 | | 2819.72
2840.84 | 83.87
73.64 | 2823
2850.84 | 81.82
70.74 |
| 2860.84
2970.84 | | 2900.84
2980.84 | | 2930.84
2990.84 | | 2950.84
3000.84 | | 2960.84
3020.84 | 72.64
72.14 |
| 3026.35
3042.75 | 76.05 | 3029.63
3049.31 | 76.07 | 3032.91
3052.59 | 76.33 | 3036.19
3055.87 | 77.15 | 3039.47
3059.15 | 78.68
79.46 |
| 3065.7
3082.09 | 77.12 | 3068.98
3085.36 | 76.76 | 3072.26
3088.64 | 77.02 | 3075.53
3095.19 | 78.12 | 3078.81
3101.74 | 80.23
84.98 |
| 3105.02 | 85.78 | 3108.3 | 86.87 | 3111.57 | 87.64 | 3114.85 | 88.15 | 3121.4 | 88.53 |
| 3124.68
3147.61 | 89.67 | 3127.96
3154.17 | 91.1 | 3134.51
3157.44 | 91.67 | 3137.79
3164 | 92.54 | 3144.34
3173.83 | 89.52
94.54 |
| 3183.66
3226.25 | 96.41 | 3186.93
3232.8 | 96.7 | 3196.76
3236.08 | 96.27 | 3209.87
3242.63 | 95.73 | 3222.97
3249.19 | 96.39
95.02 |
| 3252.46
3288.5 | | 3262.29
3295.06 | | 3265.57
3304.89 | | 3272.12
3311.44 | | 3278.67
3317.99 | 95.51
94.75 |
| 3340.93
3403.18 | 95.23 | 3363.86
3406.46 | 95.3 | 3373.69
3409.73 | 95.83 | 3383.52
3413.01 | 96.02 | 3393.35
3416.29 | 96.09
99.15 |
| | | | 2 | | | | | **== | |

```
99.78 3449.05
                                                   100.73 3468.71 102.15 3478.54
111.56 3494.92 111.61 3498.2
 3458.88
          99.3 3462.16
108.68 3488.37
                                 99.79 3465.43
                                                                                           106.89
111.47
                                                                        106.64 3527.69
 3508.03
                      3511.3
                                111.08 3514.58
                                                       110 3521.13
                                                                                            102.68
                                                   101.65 3547.34
 3530.96 101.73 3534.24 101.43 3540.79
                                              6
Sta
     Sta n Val Sta
0 .102 2698.36
6.76 .078
                        Sta n Val Sta
98.36 .102 2724.6
                                                   n Val
                                                                  Sta
                                                                        n Val
                                                     .066 2829.56
                                                                          .015 3075.53
Bank Sta: Left
                    Right
                                Lengths: Left Channel
                                                                          Coeff Contr.
                   Right Lengths: Left Channel Right 3183.66 2369.53 2114 2067.51 Station= 85.21 Elevation= 116.53 Station= 3494.92 Elevation= 111.61
        2777.08 3183.66
Left Levee
Right Levee
Blocked Obstructions num= Sta L Sta R Elev
   Sta L Sta R Elev
0 2777.08 100.71
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft.)
                                 113.20
                                                                               Left OB
                                                                                            Channel
                                                                                                         Right OB
                                               Element
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                              Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                  0.39
                                                                              0.101
2369.53
                                                                                           0.040
2114.00
                                   93.60
                                                                             30899.67
                                                                                          13522.67
                                                                                                          5238.61
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                              37605.27
                                130000.00
                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                Flow (cfs)
                                                                                           83148.69
                                                                                                          9246.04
                                 3468.36
                                                                              2688.27
                                                                                             406.58
                                    2.62
                                                                                               6.15
                                                                                                             1.76
                                    43 18
  Max Chl Dpth (ft)
                                                                                11 49
                                                                                              33 26
                                                                                                           14 03
  Conv. Total (cfs)
                                8002718.0
                                                                              2314957.0 5118581.0
                                                                                                            569180.6
  Length Wtd. (ft)
Min Ch El (ft)
                                 2152.89
                                                                              2696.08
                                                                                            418.75
                                                                                                          390.18
  Alpha
                                    3.62
                                                                                  0.23
                                                                                               3.27
                                                                                                             0.39
                                                                            132054.60
  Frctn Loss (ft)
                                     0 48
                                               Cum Volume (acre-ft)
                                                                                          2312.78
                                                                                                       20752.49
  C & E Loss (ft)
                                              Cum SA (acres)
                                                                            18303.09
                                    0.05
Warning: The cross-section end points had to be extended vertically for the computed water surface.
           Manning's n values were composited to a single value in the main channel.
          Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                RS: 156.93
REACH: Lower Reach
Description: Original IBWC Cross-section data applied to this section
                               num=
Elev
Station Elevation Data
                                            50
              Elev
                         Sta
                                              Sta
      Sta
                               107.74
89.74
        Ω
            108 14
                                             37 9
                                                     94.74
                                                                   40
                                                                                    42 3
                                                                                             93.04
                          159
                                             169
      157
             69.24
                                  68.6
                                                     65.38
                                                                  175
                                                                         64.34
                                                                                     185
                                                                                             63.94
      235
             62.24
                        245
                                 62.04
                                              255
                                                     62.04
                                                                  265
                                                                         62.34
                                                                                     275
                                                                                             62.04
      285
                          295
                                 62.24
59.14
                                              305
355
                                                                                     325
                          345
                                                     59.64
      335
             59.14
                                                                  365
                                                                         58.64
                                                                         65.38
94.74
      385
             58.84
                          395
                                 60.94
                                              405
                                                     63.64
                                                                  411
                                                                                     418
                                                                                             68 14
                                 69.24
                                              432
    493.2
             97.14
                         510
                                 98.74
                                           527.9
                                                   102.74
                                                                  535
                                                                        108.14
                                                                                     541
                                                                                           108.14
Manning's n Values
                                num=
          n Val
                         Sta
50
                               n Val
                                                                                             n Val
                                             Sta n Val
      Sta
                                                     .066
                                                                 159
                                                                          .015
                                                                                     420
                                                                                              .066
                                   .14
                                               88
      468
Bank Sta: Left Right Lengths: Left Channel Right
                                                                         Coeff Contr.
                                                                                             Expan.
120
Left Levee
               20 468
Station=
Station=
                                            86 86 86
Elevation= 108.14
                                              Elevation= 108.14
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
                                112.67
  E G Elev (ft)
                                               Element
                                                                               Left OB
                                                                                             Channel
                                                                                                         Right OB
                                0.88
                                              Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
  W.S. Elev (ft)
                                                                                  5.00
                                                                                                             5.00
                                                                                               5.00
  Crit W.S. (ft)
E.G. Slope (ft/ft)
                               80.83
0.000190
                                                                              2118.35
2118.35
                                                                                          15879.46
15879.46
                                                                                                          896.77
                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
                                                                                                            662.13
  Q Total (cfs)
                               125000.00
                                                                               3007.12 121330.70
  V Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                            73.00
                                  541.00
                                                                               120.00
                                                                                            348.00
                                                                                1.42
                                     6 62
                                                                                               7 64
                                                                                                             0 74
  Max Chl Dpth (ft)
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                9067808.0
                                                                              218144.0
                                                                                           8801631.0
                                                                                                            48032.7
                                                                                            365.04
                                     5.00
                                               Wetted Per. (ft)
                                                                               126.76
                                    57.14
                                               Shear (lb/sq ft)
                                                                                 0.20
                                                                                                             0.13
  Alpha
Frctn Loss (ft)
                                     1.30
                                               Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                  0.28
                                                                                                3.94
                                                                                                             0.10
                                                                            131156.50
                                                                                           51958.67
  C & E Loss (ft)
                                               Cum SA (acres)
                                                                            18226.71
                                                                                           2294.47
                                                                                                       20741 89
          Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
BRIDGE
RIVER: Rio Grande
REACH: Lower Reach
                                RS: 156.915
INPUT
Description: Reynosa SB
MARCH 2007 - DECK WIDTH CHANGED FROM 76 FT
56 FT (PER
               1964 AS-BUILTS)
Distance from Upstream XS = Deck/Roadway Width = Trie Coefficient =
                                      3.05
Upstream Deck/Roadway Coordinates
```

Sta Hi Cord Lo Cord

num=

13

num= 13 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 0 113.74 59.64 3 113.74 107.74

```
37.1 114.54 107.74
488 114.54 107.74
                                                                  187.4 116.04 109.24
    337.8 116.04 109.24
521.9 113.84 109.74
                                      488 114.54
535 113.84
                                                                      488 114.54 110.44
535 113.84 108.14
      541 113.84
                        59.64
Upstream Bridge Cross Section Data
Station Elevation Data num=
Sta Elev Sta Elev

0 109 14 3 107 74
                                                          Elev
                                                                               Elev
                                                                                                     Elev
                                 107.74
89.74
         0 108.14
                                                37.9
                                                        94.74
90.64
                                                                      40
120
                                                                              93.74
90.14
                                                                                                    93.04
68.74
                                                         65.38
62.74
                                                                              64.34
62.34
      157
               69.24
                            159
                                     68.6
                                                 169
                                                                       175
                                                                                            185
                                                                                                    63.94
                                                                                            225
275
    188.2
                         192.6
      235
               62.24
                         245
295
                                    62.04
                                                 255
                                                         62.04
                                                                       265
                                                                               62.34
                                                                                                    62.04
      285
               62.34
                                    62.24
                                                 305
                                                         62.24
                                                                       315
                                                                               61.64
                                                                                            325
                                                                                                    60 14
      335
               59.14
                            345
                                    59.14
                                                 355
                                                         59.64
                                                                       365
                                                                              58.64
                                                                                            375
                                                                                                    57.14
      385
              58.84
68.45
                           395
                                   60.94
69.24
                                                 405
                                                         63.64
                                                                       411
                                                                               65.38
94.74
                                                                                            418
                                                                                                    68.14
                          510
                                              527.9 102.74
                                                                       535 108.14
                                                                                            541 108.14
    493.2
             97.14
                                   98.74
Manning's n Values
                                  num=
            n Val
.14
.14
                                                                              n Val
                       Sta n Val
50 .14
                                                 Sta n Val
                                    .14
                                                  88
                                                          .066
                                                                               .015
                                                                                                     .066
Bank Sta: Left Right
120 468
Left Levee Station=
Right Levee Station=
                                  Coeff Contr. Expan.
                                   .2
                                                  .5
Elevation= 108.14
Elevation= 108.14
Downstream Deck/Roadway Coordinates
                 13
     num=
      Sta Hi Cord Lo Cord
                                    Sta Hi Cord Lo Cord
                                                                      Sta Hi Cord Lo Cord
   Sta Hi Cord Lo Cord
0 113.74 59.64
37.1 114.54 110.44
337.8 116.04 109.24
521.9 113.84 109.74
541 113.84 59.64
                                    3 113.74 107.74
37.1 114.54 107.74
488 114.54 107.74
535 113.84 109.74
                                                                   3 113.74 109.64
187.4 116.04 109.24
                                                                      488 114.54 110.44
535 113.84 108.14
Downstream Bridge Cross Section Data
                       ata num=
Sta عد
Station Elevation Data
     Sta Elev
0 108.14
                                     Elev
               Elev
                                                          Elev
                                                                               Elev
                                 107.74
89.74
                                                        94.74
                                                                       40
120
                                                                              93.74
                                                                                                    93.04
68.74
        50
                                                                                            148
              90.64
                                                  88
              69.24
63.94
                                                         65.38
62.74
                                                                              64.34
62.34
      157
                           159
                                     68.6
                                                 169
                                                                                            185
                        192.6
                         245
295
      235
              62.24
                                    62.04
                                                 255
                                                         62.04
                                                                       265
                                                                               62.34
                                                                                            275
                                                                                                    62.04
                                                 305
                                   59.14
60.94
      335
              59.14
                           345
                                                 355
                                                         59.64
                                                                       365
                                                                               58.64
                                                                                            375
                                                                                                    57.14
                                                                                         488.8
       420
              68.45
                            425
                                    69.24
                                                 432
                                                         74.04
                                                                       468
                                                                               94.74
                                                                                                    96.74
    493.2
                                   98.74
                                              527.9 102.74
Manning's n Values
                                  num=
                                                Sta n Val
88 .066
      Sta n Val Sta n Val 0 .06 50 .06
                                                                              n Val
                                                                                            Sta
420
                                    .06
              .06
                                                                                .015
                                                                                                     .066
Bank Sta: Left Right Coeff Contr. Expan.

120 468 .2 .5

Left Levee Station= 0 Elevation
Right Levee Station= 541 Elevation
                                  .2 .5

0 Elevation= 108.14

541 Elevation= 108.14
Upstream Embankment side slope
Downstream Embankment side slope
                                                                     0 horiz. to 1.0 vertical 0 horiz. to 1.0 vertical
Weir crest shape
                                                          = Broad Crested
Number of Abutments = 1
Abutment Data
Upstream
                 num=
                           Sta Eie.
                Elev
      Sta
      510
               98.8
                           535
                           2
Sta
             m num= 2
Elev Sta Elev
98.8 535 108.2
Downstream
      Sta
      510
Number of Piers = 4
Pier Data
Pier Station
                     Upstream= 37.1
                                                  Downstream= 37.1
    r Station tream num= 2
Width Elev Width Elev
Upstream
               55
    4.5 55 4.5 110.5
nstream num= 2
Width Elev Width Elev
4.5 55 4.5 110.5
Downstream
Pier Data
Pier Station
                   Upstream= 187.4
Width Elev Width Elev
4.5 55 4.5 109.3
Pier Data
    er Station Upstream= 337.8
stream num= 2
Width Elev Width Elev
4.5 55 4.5 109.3
Pier Station
Upstream

    4.5
    55
    4.5
    109.3

    nstream
    num=
    2

    Width
    Elev
    Width
    Elev

    4.5
    55
    4.5
    109.3

Downstream
Pier Station
                     Upstream=
                                      488
                                                Downstream=
                                                                        488
```

```
Width Elev
     Width
                 55
                   55 4.5 1
num= 2
      4.5
               num= 2
Elev Width Elev
55 4.5 110.5
     Width
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
         Pressure and Weir flow
              Submerged Inlet Cd
              Submerged Inlet + Outlet Cd = .8006408
Additional Bridge Parameters
         Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
         inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                 RS: 156 9
TNPUT
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
                               num=
                                              50
      Sta
0
               Elev
                          Sta
                                    Elev
                                                        Elev
                                                                                       Sta
42.3
            108.14
                                 107.74
                                                                           93.74
90.14
                                                                                                93.04
                                              37.9
                                                                     40
                                  89.74
        50
              90.64
                                                       90.64
                                                                    120
                                                                                        148
              69.24
                          159
                                    68.6
                                                       65.38
                                                                            64.34
                                                                                        185
    188.2
              63.94
                        192.6
                                  63.34
                                               195
                                                       62.74
                                                                    205
                                                                            62.34
                                                                                         225
                                                                                                62.34
              62.34
59.14
      285
                          295
                                  62.24
                                               305
                                                       62.24
                                                                    315
                                                                            61.64
                                                                                         325
                                                                                                60.14
                          345
395
                                               355
405
                                  59.14
                                                                            58.64
              58.84
                                  60.94
                                                                    411
                                                                                         418
      385
                                                       63.64
                                                                            65.38
                                                                                                68.14
      420
              68.45
                           425
                                  69 24
                                               432
                                                       74.04
                                                                                      488.8
             97.14
                                                     102.74
                                                                          108.14
                                                                                               108.14
    493.2
                          510
                                  98.74
                                             527.9
Manning's n Values
                                 num=
                                                                                                n Val
      Sta
0
            n Val
                          Sta
                                 n Val
                                               Sta
                                                      n Val
              .06
      468
Bank Sta: Left Right
120 468
Left Levee Station=
Right Levee Station=
                                 Lengths: Left Channel Right
198.66 198.52 198.75
0 Elevation= 108.14
541 Elevation= 108.14
                                                                             Coeff Contr.
                                                                                                Expan.
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                              112.17
                                                                                  Left OB
                                                                                                Channel
                                                                                                             Right OB
                                                 Element
                                                Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                0.033
198.52
                                      0.85
                                                                                   0.062
                                                                                                                0 060
                                 111.32
                                                                                  198.66
                                     80.83
                                                                                 2062.23
                                                                                             15716.74
                                                                                                               862.63
                                 0.000189
  E.G. Slope
                                                                                  4623.18
                                                                                              118927.00
  O Total (cfs)
                                 125000.00
                                                                                                                1449.81
                                                  Flow (cfs)
  Top Width (ft)
Vel Total (ft/s)
                                                Top Width (ft)
Avg. Vel. (ft/s)
                                   541.00
                                                                                  120.00
                                                                                               348.00
                                                                                                                73.00
                                      6.71
                                                                                    2.24
                                                                                                   7.57
                                                                                                                 1.68
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                   17.19
                                     54 18
                                                                                                 45 16
                                                                                                                11 82
                                 9093620.0
                                                                                 336331.8
                                                                                               8651816.0
                                                                                              365.04
                                   198.53
57.14
                                                                                  126.30
                                                                                                                78.64
                                                Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
  Alpha
                                      1.22
                                                                                     0.43
                                                                                                   3.84
  Frctn Loss (ft)
                                      0.02
                                                 Cum Volume (acre-ft)
                                                                               131153.10
                                                                                               51929.69
                                                                                                             165480.50
                                                                                               2294.35 20741.87
                                                Cum SA (acres)
  C & E Loss (ft)
                                      0.07
                                                                               18226.67
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
CROSS SECTION
RIVER: Rio Grande
                                 RS: 156.87
REACH: Lower Reach
TNPUT
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
                               num=
                        Sta
               Elev
                                    Elev
      Sta
            108.14
                                 108.14
                                                     100.44
                                                                           98.94
84.44
67.14
         0
                            35
                                                 48
                                                                   72.3
                                                                                                98.64
              98.04
71.44
                                                                                        270
                                                                  288
    274.3
                        279.3
                                  70.64
                                               285
                                                       68.35
                                                                                        302
                                                                                                65.29
                         315
      305
355
              65.04
61.84
                                  63.54
                                               325
375
                                                       63.04
                                                                    335
                                                                            63.04
61.04
                                                                                         345
                                                       61.04
                                  61.84
                                                                   415
475
      385
              61.34
                          395
                                  61.64
                                               405
                                                       61.84
                                                                            62.34
                                                                                        435
                                                                                                62.34
              62.14
      445
                           455
                                  61.34
                                                465
                                                                            61.64
                                                       61.84
      485
              61.04
                          495
                                  61.04
                                               505
                                                       61.94
                                                                    515
                                                                            62.34
                                                                                        525
                                                                                                63.14
                                  62.64
68.74
                                                555
                                                       61.04
87.04
    577.3
                        582.3
                                                                  678.1
                                                                                      683.1
              66.34
                                                600
                                                                            94.04
      695
              95 54
                           759
                                             765.8
                                                                 770.8
    819.9 108.14
Manning's n Values
                                 n Val
      Sta n Val
                                               Sta
                                                      n Val
                                                                    Sta
                                                                           n Val
                                                                                                n Val
                                                      .015
Bank Sta: Left Right 270 600
                                 Lengths: Left Channel
                                                               Right
                                                                             Coeff Contr.
                                               91
                                                         91
                                  0
                                                Elevation= 108.14
```

Left Levee

Station=

Elevation=

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 112.08 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|-----------|------------|
| Vel Head (ft) | 0.71 | Wt. n-Val. | 0.060 | 0.025 | 0.060 |
| W.S. Elev (ft) | 111.37 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 80.12 | Flow Area (sq ft) | 5147.16 | 15681.91 | 3289.57 |
| E.G. Slope (ft/ft) | 0.000088 | Area (sq ft) | 5147.16 | 15681.91 | 3289.57 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 8422.31 | 111987.10 | 4590.56 |
| Top Width (ft) | 819.90 | Top Width (ft) | 270.00 | 330.00 | 219.90 |
| Vel Total (ft/s) | 5.18 | Avg. Vel. (ft/s) | 1.64 | 7.14 | 1.40 |
| Max Chl Dpth (ft) | 50.33 | Hydr. Depth (ft) | 19.06 | 47.52 | 14.96 |
| Conv. Total (cfs) | 13288180.0 | Conv. (cfs) | 895336.9 | 11904840. | 0 488001.5 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 276.51 | 347.13 | 224.38 |
| Min Ch El (ft) | 61.04 | Shear (lb/sq ft) | 0.10 | 0.25 | 0.08 |
| Alpha | 1.71 | Stream Power (lb/ft s) | 0.17 | 1.78 | 0.11 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 131136.70 | 51858.14 | 165471.10 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 18225.78 | 2292.81 | 20741.20 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Note:

BRIDGE

RIVER: Rio Grande

RS: 156.855 REACH: Lower Reach

Description: Reynosa NB

MARCH 2007 - PIER DIAMETERS AND HEIGHTS
CHANGED TO REFLECT 1986 AS-BUILT PLANS
DIAMETER CHANGED FROM 8.2
& 5 FT TO 16.42 & 8 FT

PIER HEIGHTS BASED ON ELEVATIONS ON

AS-BUILTS
Distance from Upstream XS = 25
Deck/Roadway Width = 56
This Coefficient = 2.6

Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 14

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|-------|---------|---------|-------|---------|---------|-------|---------|---------|
| 0 | 117.05 | 59.64 | 3 | 117.05 | 59.64 | 3 | 117.05 | 109.84 |
| 74.8 | 119.54 | 112.34 | 175.8 | 122.04 | 114.84 | 276.8 | 124.04 | 116.84 |
| 377.8 | 124.84 | 117.64 | 478.8 | 124.14 | 116.94 | 579.8 | 123.34 | 116.14 |
| 680.6 | 121.94 | 114.74 | 768.3 | 119.14 | 111.94 | 816.9 | 117.54 | 110.34 |
| 816.9 | 117.54 | 59.64 | 819.9 | 117.44 | 59.64 | | | |

Upstream Bridge Cross Section Data Station Elevation Data num=

| Sta | Elev | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 108.14 | 35 | 108.14 | 48 | 100.44 | 72.3 | 98.94 | 77.3 | 98.64 |
| 87 | 98.04 | 173.3 | 84.54 | 175 | 84.54 | 178.3 | 84.44 | 270 | 81.54 |
| 274.3 | 71.44 | 279.3 | 70.64 | 285 | 68.35 | 288 | 67.14 | 302 | 65.29 |
| 305 | 65.04 | 315 | 63.54 | 325 | 63.04 | 335 | 63.04 | 345 | 62.74 |
| 355 | 61.84 | 365 | 61.84 | 375 | 61.04 | 375.3 | 61.04 | 380.3 | 61.14 |
| 385 | 61.34 | 395 | 61.64 | 405 | 61.84 | 415 | 62.34 | 435 | 62.34 |
| 445 | 62.14 | 455 | 61.34 | 465 | 61.84 | 475 | 61.64 | 481.3 | 61.64 |
| 485 | 61.04 | 495 | 61.04 | 505 | 61.94 | 515 | 62.34 | 525 | 63.14 |
| 535 | 62.84 | 545 | 62.64 | 555 | 61.04 | 565 | 62.34 | 575 | 65.29 |
| 577.3 | 66.34 | 582.3 | 68.74 | 600 | 87.04 | 678.1 | 94.04 | 683.1 | 94.44 |
| 695 | 95.54 | 759 | 98.54 | 765.8 | 99.74 | 770.8 | 100.54 | 813 | 107.84 |
| 819.9 | 108.14 | | | | | | | | |
| | | | | | | | | | |

| Manning's | n Values | | num= | 5 | | | | | |
|-----------|----------|-----|-------|-----|-------|-------|-------|-----|-------|
| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
| 0 | .06 | 270 | .066 | 285 | .015 | 582.3 | .066 | 600 | .06 |

Bank Sta: Left Right
270 600
Left Levee Station=
Right Levee Station= Coeff Contr. Expan. .2

Elevation= 108.14 Station= 819.9 Elevation= 108.14 Right Levee

Downstream Deck/Roadway Coordinates num= 14

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | |
|-------|---------|---------|-------|---------|---------|-------|---------|---------|--|
| 0 | 117.05 | 59.64 | 3 | 117.05 | 59.64 | 3 | 117.05 | 109.84 | |
| 74.8 | 119.54 | 112.34 | 175.8 | 122.04 | 114.84 | 276.8 | 124.04 | 116.84 | |
| 377.8 | 124.84 | 117.64 | 478.8 | 124.14 | 116.94 | 579.8 | 123.34 | 116.14 | |
| 680.6 | 121.94 | 114.74 | 768.3 | 119.14 | 111.94 | 816.9 | 117.54 | 110.34 | |
| 816.9 | 117.54 | 59.64 | 819.9 | 117.44 | 59.64 | | | | |

Downstream Bridge Cross Section Data
Station Elevation Data num= 57

| Station E | revacion | Data | muni= | 5/ | | | | | |
|-----------|----------|-------|--------|-------|--------|-------|-------|-------|--------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 108.14 | 35 | 108.14 | 48 | 100.44 | 72.3 | 98.94 | 77.3 | 98.64 |
| 87 | 98.04 | 173.3 | 84.54 | 175 | 84.54 | 178.3 | 84.44 | 267 | 81.63 |
| 270 | 81.54 | 274.3 | 71.44 | 279.3 | 70.64 | 285 | 68.35 | 288 | 67.14 |
| 302 | 65.29 | 305 | 65.04 | 315 | 63.54 | 325 | 63.04 | 335 | 63.04 |
| 345 | 62.74 | 355 | 61.84 | 365 | 61.84 | 375 | 61.04 | 375.3 | 61.04 |
| 380.3 | 61.14 | 385 | 61.34 | 395 | 61.64 | 405 | 61.84 | 415 | 62.34 |
| 435 | 62.34 | 445 | 62.14 | 455 | 61.34 | 465 | 61.84 | 475 | 61.64 |
| 481.3 | 61.64 | 485 | 61.04 | 495 | 61.04 | 505 | 61.94 | 515 | 62.34 |
| 525 | 63.14 | 535 | 62.84 | 545 | 62.64 | 555 | 61.04 | 565 | 62.34 |
| 575 | 65.29 | 577.3 | 66.34 | 582.3 | 68.74 | 600 | 87.04 | 678.1 | 94.04 |
| 683.1 | 94.44 | 695 | 95.54 | 759 | 98.54 | 765.8 | 99.74 | 770.8 | 100.54 |
| 813 | 107.84 | 819.9 | 108.14 | | | | | | |
| Manning's | n Values | 3 | num= | 6 | | | | | |
| | | | | | | | | | |

| Sta | n Val | Sta | n Val | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | .14 | 267 | .14 | 270 | .066 | 285 | .015 | 582.3 | .066 |
| 600 | .04 | | | | | | | | |

Bank Sta: Left Right 270 600
Left Levee Station= Coeff Contr. Expan. 35

Elevation= 108.14 Elevation= 108.14

98.64

```
Upstream Embankment side slope
Downstream Embankment side slope
                                                                                                          0 horiz. to 1.0 vertical 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = Elevation at which weir flow begins =
Energy head used in spillway design
Spillway height used in design
                                                                                          = Broad Crested
Weir crest shape
Number of Piers = 8
Pier Data
                                                         74.8
                                                                                                            74.8
Pier Station
                                 Upstream=
                                                                          Downstream=
                     on Upstream= /4.
num= 4
Elev Width Elev
60 16.42 89.63
num= 4
Elev Width Elev
60 16.42 89.63
Upstream
                                                                         Width Elev
       Width
                                                                                                          Width
                                                                         8 89.63
                                                                                                           8
      16.42
                                                                                                                       112.5
Downstream
                                                                         Width Elev
8 89.63
                                                                                                          Width
                                                                                                                          Elev
       Width
Pier Data
                                 Upstream= 175.8
                                                                            Downstream=
                                                                                                          175.8
Pier Station
                   num 4

Elev Width Elev
60 16.42 89.22
m num 4

Elev Width Elev
60 16.42 89.22
Upstream
Width
                                                                         Width Elev
                                                                          8 89.22
      16.42
                                                                                                                             115
                                                                         Width Elev
8 89.22
                                                                                                          Width
       Width
                                                                                                                          Elev
Pier Data
Pier Station
                                Upstream= 276.8
                                                                           Downstream=
                                                                                                          276.8
                    num= 4
Elev Width Elev
60 16.42 71.28
n num=
Elev Width Elev
60 16.42 71.28
Upstream
                                                                         Width Elev
8 71.28
                                                                                                           8
      16.42
                                                                                                                             117
                                                                         Width Elev
9 71.28
                                                                                                          Width
                                                                                                                           Elev
       Width
   16.42
Pier Data
Pier Station
                                Upstream= 377.8
                                                                          Downstream=
       | Section | Upstream | 377. | Cream | num | 4 | Width | Elev | Width | Elev | E
Upstream
                                                                          Width Elev
                                                                          8 72.175
                                                                                                             8
      16.42
Downstream
                                                                         Width Elev
8 72.175
                                                                                                          Width
                                                                                                                           Elev
     16.42
                                                                                                                       117.7
Pier Data
                              Upstream= 478.8
                                                                                                          478.8
                                                                          Downstream=
       Upstream
                                                                         Width Elev
                                                                                                          Width
                                                                                                                          Elev
                                                                          8 73.167
                                                                                                           8 117.1
      16.42
Downstream
                                                                         Width Elev
8 73.167
     16.42
                                                                                                                       117.1
Pier Data
Pier Station
                                 Upstream= 579.8
                                                                          Downstream=
                                                                                                          579.8
       Upstream
                                                                         Width Elev
                                                                                                          Width
                                                                                                                          Elev
                                                                           8 72.175
                                                                                                                       116.3
      16.42
        nstream num= 4
Width Elev Width Elev
16.42 60 16.42 72.175
                                                                                                          Width Elev
8 116.3
Downstream
                                                                         Width Elev
8 72.175
      16.42
Pier Data
      r Station Upstream-
tream num= 4
Width Elev Width Elev
16.42 60 16.42 71.78
natream num= 4
                             Upstream= 680.6
Pier Station
                                                                         Downstream=
                                                                                                          680.6
Upstream
                                                                         Width Elev
                                                                                                          Width
                                                                                                                          Elev
                                                                                                           8 114.9
       nstream num= 4
Width Elev Width Elev
16.42 60 16.42 71.78
Downstream
                                                                         Width Elev
8 71.78
                                                                                                          Width
                                                                                                                          Elev
     16.42
                                                                                                                       114.9
                                                                                                                8
Pier Data
      r Station Upstream-
tream num= 4
Width Elev Width Elev
16.42 60 16.42 89.8
                             Upstream= 768.3 Downstream=
Pier Station
                                                                                                          768 3
                                                                         Width
                                                                                          Elev
                                                                                                          Width
                                                                                                                           Elev
                                                                                                                       112.1
       nstream num= 4
Width Elev Width Elev
16.42 60 16.42 89.8
Downstream
                                                                          Width
                                                                                          Elev
                                                                                                          Width
      16.42
                                                                                                                       112.1
                                                                           8
                                                                                          89.8
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
              Energy
Selected Low Flow Methods = Highest Energy Answer
High Flow Method
              Energy Only
Additional Bridge Parameters
              Add Friction component to Momentum
              Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
              inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                    RS: 156.84
TNPIIT
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
                                                    num=
         Sta Elev
0 108.14
                                      Sta Elev
35 108.14
                                                                          Sta
                                                                                          Elev
                                                                                    100.44
                                                                             48
                                                                                                          72.3
                                                                                                                        98.94
                                      173.3
                                                                          1.75
                      98.04
                                                   84.54
71.44
                                                                                    84.54
70.64
                                                                                                       178.3
                                                                                                                         84.44
                                                                                                                                             267
```

```
345
             62.74
61.14
                           355
                                  61.84
                                               365
                                                       61.84
61.64
                                                                    375
                                                                            61.04
                                                                                      375.3
                                                                                                61.04
62.34
    380.3
      435
              62.34
                           445
                                  62.14
                                               455
                                                       61.34
                                                                    465
                                                                            61.84
                                                                                         475
                                                                                                61.64
              61.64
                           485
                                  61.04
                                               495
                                                       61.04
                                                                    505
                                                                            61.94
                                                                                         515
      525
              63.14
                           535
                                  62.84
                                               545
                                                       62.64
                                                                    555
                                                                            61.04
                                                                                        565
                                                                                                62.34
                                                                                      678.1
770.8
      575
                        577.3
                                                                    600
                                                                            87.04
                           695
                                                                 765.8
    683.1
                                                                                               100.54
                                  95.54
                                               759
                                                       98.54
                                                                            99.74
              94.44
                        819.9
      813
           107.84
                                 108.14
Manning's n Values
                                 num=
                          Sta
267
                                  n Val
                                                      n Val
                                                                                                n Val
             n Val
                                                                                        Sta
                                                                                      582.3
                                   .14
                .14
                                               270
                                                        .066
                                                                    285
                                                                             .015
                                                                                                  .066
      600
                                Lengths: Left Channel Right
490.49 510 528.74
35 Elevation= 108.14
819.9 Elevation= 108.14
Bank Sta: Left Right 270 600
                                                                             Coeff Contr.
                                                                                                Expan.
               Station=
Station=
Left Levee
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
Vel Head (ft)
                                                Element
Wt. n-Val.
                                                                                 Left OB
                                   112.02
                                                                                                Channel
                                                                                                             Right OB
                                                                                   0.140
                                0.76
111.25
80.12
0.000093
                                                                                                 0.025
                                                Reach Len. (ft)
Flow Area (sq ft)
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                510.00
                                                                                                              528.74
                                                                                  490.49
  E.G. Slope (ft/ft)
                                                Area (sq ft)
                                                                                 5116.68
                                                                                             15644.38
                                                                                                             3264.57
                                                Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  Q Total (cfs)
                                 125000.00
                                                                                   3672.81
                                                                                               114354.50
                                                                                                                6972.68
  Top Width (ft)
Vel Total (ft/s)
                                                                                                330.00
                                                                                                              219.90
                                    819.90
                                                                                  270.00
                                      5.20
                                                                                    0.72
                                                                                                  7.31
                                                                                                                 2 14
                                                                                   18.95
  Max Chl Dpth (ft)
                                     50.21
  Conv. Total (cfs)
Length Wtd. (ft)
                                 12961240.0
                                                Conv. (cfs)
Wetted Per. (ft)
                                                                                  380833.4
                                                                                               11857410.0
                                                                                                                 722996.3
                                    510.58
                                                                                                              224.27
                                                Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                   0.11
                                                                                                0.26
  Min Ch El (ft)
                                     61.04
                                                                                                                 0.08
                                      1.82
                                                                                                   1.91
  Frctn Loss (ft)
                                                                               131126.60
                                                                                               51828.29
                                                                                                             165464.70
  C & E Loss (ft)
                                      0 09
                                                Cum SA (acres)
                                                                               18225.32
                                                                                               2292.17
                                                                                                           20740 82
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

92.25 92.15

91.09

94.14

92.9

84.13 81.81

75.91

87.33

795.97

812.31

828.65

861.33

894.02

910.36 926.7

976.51

1211.8

75.15 1076.51 75.41 1162.61

81.42 1179.01 85.17 1195.41

92.01

91.22

93.92

87.44

83.77

76 11

75.91

86.26

92.1

CROSS SECTION

RIVER: Rio Grande

RS: 156.7 REACH: Lower Reach

92.7

91.82

91.67

91.46 94.55

93.77

86.41

786.16

818.85

851.53

867.87 884.21

900.55

79.48 933.24

75.23 1116.51

76 1169.17 83.37 1185.57

87.18 1201.97 87.08 1218.36

802.5

782.89

799.24

815.58

848.26

864.6 880.94

897.29

929 97

1096.51

1165.89

1182.29

1198.69

92.66 91.72

91.28

94.68

93.5 92.5

85.61 82.84

76.91

789.43 805.77

822.11

854.8

871.14 887.48

903.82

936 51

75 1036.51 75.4 1136.51

77.21 1172.45 83.78 1188.85

87.64 1205.24

92.48

91.86

91.11

94.53

93.22 91.34

84.88

75.91

792.7

809.04

825.38 841.72 858.07

874.41 890.75

907.09

956.51

75.06 1056.51 75.77 1156.51

79.64 1175.73 84.27 1192.13

87.5 1208.52 86.6 1224.92

Description: Bathymetric elevations translated from IBWC 2008 Cross-sections

| | | LOII. Batil | | | | Taceu II | OIII TDWC | 2000 CIC | 22-2CCT | UIID |
|---|--------|---------------|--------|----------------|--------|----------------|---------------|----------------|---------|--------|
| 3 | | Elevation | | | 415 | | | | | |
| | Sta | Elev | Sta | Elev | | Elev | Sta | | Sta | Elev |
| | 0 | 108.46 | 3.28 | 108.74 | | 108.89 | 9.84
26.24 | 108.92 | | 108.94 |
| | 16.4 | 109 | 19.68 | 109.03 | | | | | 29.52 | |
| | 32.8 | 109.51 | 36.08 | 109.57 | | | 42.64 | | 45.92 | |
| | 49.2 | 109.32 | 52.48 | 108.99 | 55.76 | 108.73 | 59.04 | 108.4 | 62.32 | 108 |
| | 65.6 | | 68.88 | 106.57 | 72.16 | 105.71 | 75.44 | 105.18 | 78.72 | 104.7 |
| | 82 | | 85.28 | 103.56 | 88.56 | 102.89 | 91.84 | 102.14 | | |
| | 98.4 | 100.29 | 101.68 | 99.27 | 104.96 | 98.41 | 108.24 | 97.65 | 111.52 | 96.71 |
| | 114.8 | 95.68 | 118.08 | 94.26 | 121.36 | 92.44 | 124.64 | | 127.92 | 88.44 |
| | 131.2 | 87.47 | 134.48 | 86.27 | 137.76 | 85.33 | | 84.35 | 144.32 | |
| | 147.6 | 85.06 | 150.88 | | | 85.03 | 157.44 | | | 84.58 |
| | 164 | 84.32 | 167.28 | 84.07 | | 83.42 | | 82.37 | | 81.56 |
| | 180.4 | 81.37
83.1 | 183.68 | 81.33
83.44 | 285.37 | 81.33 | 288.65 | 81.69
82.99 | 291.93 | |
| | 295.21 | | 298.49 | 83.44 | 301.77 | 83.22 | 305.05 | 82.99 | 308.33 | |
| | 311.61 | 82.57 | | 82.51 | | | | 82.39 | | |
| | 328.01 | 82.2 | 331.29 | | 334.57 | 84.41 | 337.85 | | | 86.96 |
| | 344.41 | 88.26 | 347.69 | | 350.97 | 89.88
96.54 | 354.25 | 91.01 | 357.53 | 92.47 |
| | 360.81 | 93.99 | 364.09 | | | | 370.65 | 97.85 | | |
| | 377.21 | 100.54 | 380.49 | | 383.77 | | 387.05 | | | |
| | 393.61 | 106.21 | 396.89 | | 400.17 | | 403.45 | | | |
| | 410.01 | 107 | 413.29 | | 416.57 | | 419.85 | | | |
| | | | 429.69 | | 439.53 | | 446.09 | | | 107.47 |
| | 452.65 | | 455.93 | | 459.21 | | 462.49 | | | 108.6 |
| | 472.33 | | 475.61 | 111.35 | 478.89 | | 482.17 | | | 114.46 |
| | 488.73 | | 492.01 | | 495.28 | | 498.55 | 115.76 | | 115.81 |
| | 505.09 | 115.78 | 508.35 | 115.72 | | 115.49 | 514.89 | | | |
| | 521.43 | | 524.7 | | | 105.11 | 531.23 | | 534.5 | |
| | 537.77 | | 541.04 | | 544.31 | | 547.57 | | | |
| | | 104.63 | 557.38 | | | 104.42 | 563.92 | | | 104.4 |
| | 570.45 | 104.34 | 573.72 | | | 104.55 | 580.26 | | | |
| | 586.79 | 105.64 | 590.06 | 105.96 | | 105.91 | 596.6 | 105.7 | | |
| | 603.14 | | 606.4 | | | 105.36 | | 104.8 | 616.21 | |
| | 619.48 | 104.18 | 622.75 | | 626.01 | | 629.28 | | | |
| | 635.82 | 102.16 | 639.09 | 102.03 | 642.36 | 101.81 | 645.62 | | 648.89 | |
| | 652.16 | 100.87 | 655.43 | | 658.7 | 100.33 | 661.97 | | 665.23 | 99.66 |
| | 668.5 | 99.5 | 671.77 | | 675.04 | 99.07 | 678.31 | 98.9
98.39 | 681.58 | 98.8 |
| | 684.84 | | 688.11 | | | 98.52 | | | | 98.35 |
| | 701.19 | | 704.45 | 98.24 | | 98.36 | | 98.44 | | 98.08 |
| | 717.53 | 97.61 | 720.8 | 97.41 | 724.06 | 97.45 | 727.33 | | 730.6 | 97.41 |
| | 733.87 | 97.36 | 737.14 | 97.13 | 740.41 | 96.59 | 743.67 | | 746.94 | 95.75 |
| | 750.21 | 95.31 | 753.48 | 94.94 | ,50.,5 | 94.57 | 760.02 | 94.16 | 763.28 | 93.67 |
| | 766.55 | 93.38 | 769.82 | 93.25 | 773.09 | 93.07 | 776.36 | 92.89 | 779.63 | 92.68 |

```
86.65 1234.76
                                                             87.16 1241.32
                                                                                    87.31 1244.6
 1247.88
               87.51 1251.16
88.55 1267.56
                                      87.71 1254.44
88.75 1270.84
                                                             87.91 1257.72
                                                                                    88.1 1261
89.45 1277.4
                                                                                                           88.35
               90.71 1283.96
93.52 1300.35
 1280.68
                                      91.45 1287.24
                                                             92.33 1290.52
                                                                                    92.97
                                                                                              1293.8
                                                                                                           93.22
                                                             94.52 1306.91
98.77 1323.31
 1297.08
                                      93.88 1303.63
                                                                                    95.32 1310.19
               97.48 1316.75
98.75 1333.15
97.97 1349.55
 1313.47
                                      98.54 1320.03
                                                                                     98.8 1326.59
                                                                                                           98.77
                                      98.54 1336.43
97.89 1352.83
                                                                                    97.98 1342.99
97.82 1359.39
 1329.87
                                                             98.22 1339.71
 1346.27
                                                             97.89 1356.11
                                      97.61 1369.23
97.32 1385.63
97.05 1402.02
                                                                                    97.5 1375.79
97.17 1392.19
97.09 1408.58
 1362.67
               97.73 1365.95
97.37 1382.35
                                                             97.55 1372.51
              97.05 1398.74
97.14 1415.14
99.7 1431.52
101.4 1447.85
                                                             97.06 1405.3
97.55 1421.7
 1395.46
                                                                                                           97.15
                                    97.11 1418.42
100.15 1434.78
                                                                                    98.44 1424.98
                                                            100.61 1438.05
                                                                                   100.99 1441.32
 1428.25
                                    101.6 1451.12
103.87 1467.46
                                                           101.96 1454.39
104.17 1470.72
                                                                                  102.52 1457.66
104.33 1473.99
 1444.59
                                                                                                         103 08
              103.51 1464.19
 1460.92
                                                                                                         104.55
                                                           104.17 1470.72
105.5 1487.06
105.57 1503.4
105.63 1519.73
105.35 1536.07
104.96 1552.41
104.89 1568.74
104.7 1585.08
 1477.26
1493.6
              104.89 1480.53
105.56 1496.86
                                    105.28 1483.79
105.58 1500.13
                                                                                  105.5 1490.33
105.58 1506.67
             105.64 1513.2
105.5 1529.54
105.12 1545.87
                                    105.64 1516.47
105.46 1532.8
105.07 1549.14
                                                                                  105.57 1523
105.26 1539.34
104.93 1555.68
 1509.93
                                                                                                         105.55
  1526.27
 1542.61
             104.87 1562.21
104.76 1578.55
                                    104.89 1565.48
104.73 1581.81
 1558.94
                                                                                   104.87 1572.01
 1575.28
                                                                                  104.65 1588.35
 1591.62 104.65 1594.88
1607.95 107.46 1611.22
1624.29 107.16 1627.56
                                    104.66 1598.15
108.51 1614.49
                                                           104.77 1601.42
108.72 1617.76
                                                                                  105.08 1604.69
108.46 1621.02
                                                                                                           108.1
                                                           105.09 1634.09
                                     105.84 1630.82
                                                                                   104.98 1640.63
Manning's n Values
                             Sta n Val
                                                           n Val
                                                    Sta
                                                                            Sta
                                                                                   n Val
      Sta n Val Sta
0 .06 505.09
                                      .085 884.21
                                                                .07 929.97
                                                                                     .025 1179.01
              .085 1614.49
 1424.98
                                      .06
Bank Sta: Left Right 884.21 1201.97
                                    Lengths: Left Channel Right 520.54 510.48 507.59
                                                                                     Coeff Contr.
                                                                                                           Expan.
                                                                                                .1
Ineffective Flow
                             num=
                           Elev Permanent
  Sta L Sta R
0 884.21
                            92 5
                        87.64
 1201.97 1656.96
                 Station= 505.09
Station= 1614.49
                                                     Elevation= 115.78
Left Levee
                                                     Elevation= 108.72
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
                                    111.84
  F.G. Elev (ft)
                                                      Element
                                                                                           Left OB
                                                                                                         Channel
                                                                                                                         Right OB
  Vel Head (ft)
                                                      Wt. n-Val.
                                                                                             0.085
                                                                                                            0.037
  W.S. Elev (ft)
Crit W.S. (ft)
                                      110.64
                                                     Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                           507.59
                                                                                           520 54
                                                                                                           510.48
                              0.000570
125000.00
1143.07
                                                     Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                                                          4447.46
                                                                                                        10446.10
                                                                                                                         5163.10
                                                                                                         101019.50
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                          317.76
                                                                                           370.32
                                                                                                                           454.99
                                                                                            2.16
                                           6.25
                                                                                                              9 67
                                                                                                                              2.81
                                         35.64
                                                                                                            32.87
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                      Conv. (cfs)
Wetted Per. (ft)
                                     5233813 0
                                                                                          399109.8
                                                                                                         4229738 0
                                                                                                                           604964 9
                                                                                                          323.57
                                                                                                                           464.11
                                                                                            0.42
                                         75.00
                                                      Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                          1.15
11.12
                                                                                                                              0.39
  Alpha
                                                                                       131072.80
  Frctn Loss (ft)
                                                      Cum Volume (acre-ft)
                                                                                                         51675.55
                                                                                                                         165413.50
                                          0.16
  C & E Loss (ft)
                                          0.19
                                                      Cum SA (acres)
                                                                                        18221.71
                                                                                                          2288.38
                                                                                                                       20736.72
Warning: The cross-section end points had to be extended vertically for the computed water surface.
```

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Note:

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 156.6 REACH: Lower Reach

| INPUI | | | | | | | | | |
|--------|------------|--------|----------|--------|----------|---------|----------|----------|--------|
| | ion: Bathy | | elevatio | | lated fr | om IBWC | 2008 Crc | ss-secti | ons |
| | Elevation | | num= | 460 | | | | | |
| Sta | Elev | Sta | | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 105.88 | 3.28 | 105.78 | 6.55 | 105.78 | 9.83 | 106.15 | 13.11 | 106.22 |
| 19.66 | 105.78 | 26.21 | 105.29 | 29.49 | 105 | 32.77 | 105.04 | 39.32 | 105.24 |
| 42.59 | 105.3 | 45.87 | 105.42 | 49.15 | 105.65 | 52.42 | 106 | 62.25 | 108.56 |
| 68.81 | 110.2 | 75.36 | 111.92 | 81.91 | 113.55 | 85.19 | 114.32 | 88.47 | 114.99 |
| 91.74 | 115.41 | 95.02 | 115.62 | 101.57 | 115.62 | 108.12 | 115.68 | 111.4 | 115.66 |
| 114.68 | 115.14 | 117.95 | 111.73 | 121.23 | 106.51 | 124.51 | 105.08 | 131.06 | 105.1 |
| 137.61 | 105.09 | 140.89 | 105.05 | 147.44 | 104.81 | 150.72 | 104.65 | 157.27 | 104.06 |
| 163.83 | 103.87 | 170.38 | 103.91 | 176.93 | 104.2 | 180.21 | 104.42 | 183.48 | 104.44 |
| 190.04 | 104.72 | 193.31 | 104.57 | 196.59 | 104.36 | 199.87 | 104.27 | 206.42 | 104.45 |
| 209.7 | 104.39 | 212.97 | 104.27 | 226.08 | 104.1 | 229.35 | 104.18 | 235.91 | 104.16 |
| 242.46 | 104.2 | 245.74 | 104.17 | 252.29 | 104.2 | 255.57 | 104.18 | 262.12 | 103.96 |
| 265.4 | 104.09 | 275.23 | 104.06 | 281.78 | 104.1 | 285.06 | 104.01 | 288.33 | 103.81 |
| 291.61 | 103.85 | 298.16 | 104.03 | 301.44 | 104.05 | 304.71 | 104.12 | 307.99 | 104.07 |
| 317.82 | 104.09 | 321.1 | 104.05 | 327.65 | 104.08 | 330.93 | 104.01 | 334.2 | 103.79 |
| 340.76 | 103.74 | 347.31 | 103.8 | 350.59 | 103.72 | 357.14 | 103.41 | 360.42 | 103.38 |
| 363.69 | 103.43 | 370.24 | 103.42 | 373.52 | 103.33 | 376.8 | 103.15 | 380.07 | 103.21 |
| 383.35 | 103.49 | 386.63 | 103.67 | 389.9 | 103.74 | 393.18 | 103.69 | 399.73 | 103.85 |
| 406.29 | 103.56 | 409.56 | 103.5 | 412.84 | 103.5 | 416.12 | 103.42 | 419.39 | 103.27 |
| 425.95 | 103.38 | 429.22 | 103.28 | 432.5 | 103.24 | 435.77 | 103.4 | 442.33 | 103.56 |
| 445.6 | 103.77 | 448.88 | 103.84 | 452.16 | 103.74 | 455.43 | 103.52 | 458.71 | 103.44 |
| 465.26 | 103.57 | 468.54 | 103.39 | 471.82 | 103.3 | 475.09 | 103.31 | | 103.14 |
| 488.2 | 103.15 | 494.75 | 102.96 | 498.03 | 103.01 | 501.3 | 103.13 | 504.58 | 103.14 |
| 507.86 | 103.03 | 511.13 | 103.01 | 520.96 | 103.28 | 527.52 | 103.33 | 530.79 | 103.18 |
| 534.07 | 103.17 | 540.62 | 103.34 | 543.9 | 103.28 | 547.18 | 103.32 | 553.73 | 103.29 |
| 557.01 | 103.22 | 566.83 | 103.29 | 570.11 | 103.29 | 573.39 | 103.38 | 576.66 | 103.41 |
| 579.94 | 103.33 | 586.49 | 103.27 | 589.77 | 103.16 | 596.32 | 103.11 | 602.88 | 103.14 |
| 606.15 | 103.1 | 609.43 | 103 | 615.98 | 102.93 | 622.53 | 102.9 | 629.09 | 102.63 |
| 632.36 | 102.61 | 635.64 | 102.74 | 638.92 | 102.33 | 642.19 | 101.7 | | 101.42 |
| 648.75 | 101.62 | 652.02 | 102.56 | 655.3 | 103.35 | 658.58 | 103.64 | 661.85 | 103.69 |
| 668.41 | 103.98 | 671.68 | 104.44 | 674.96 | 104.84 | 678.23 | 105.37 | 681.51 | 106.42 |
| 684.79 | 107.07 | 688.06 | 106.87 | 691.34 | 106.45 | 697.89 | 104.99 | 701.17 | 104.09 |
| 704.45 | 103.71 | 707.72 | 103.97 | 711 | 104.6 | 714.28 | 104.83 | 717.55 | 104.71 |
| 720.83 | 104.68 | 724.11 | 104.75 | 727.38 | 104.89 | 730.66 | 105.13 | 733.94 | 105.3 |
| 737.21 | 104.91 | 740.49 | 103.81 | 743.76 | 102.42 | 750.32 | 99.32 | 753.59 | 98.46 |

760.15

98.17

```
773.25
                103.84
                             776.53
792.91
                                           105.23
                                                         779.81
                                                                      105.75
                                                                                   783.08
799.46
                                                                                                105.88
105.3
                                                                                                               786.36
802.74
                                                                                                                            105.49
                                                                                      822.4
                                                                                                  105.35
   806.02
                106.26
                              809.29
                                             106.1
                                                         819.12
                                                                      105.33
                                                                                                               825.68
                                                                                                                             105.68
   828.95
                  105.4
                              832.23
                                           104.83
                                                         835.51
                                                                        103.8
                                                                                  838.78
                                                                                                  102.62
                                                                                                               842.06
   845.34
                100.22
                              848.61
                                             99.03
                                                         851.89
                                                                        97.59
                                                                                    855.16
                                                                                                   95.86
                                                                                                               858.44
                             864.99
881.38
                                             91.92
89.28
                                                                        91.1
89.08
                                                                                    871.55
894.48
                                                                                                   90.36
89.25
                                                                                                               874.82
    878.1
                    89.5
                                                         891.21
                                                                                                               897.76
   901.04
                  89.84
89.89
                             904.31
923.97
                                             89.92
89.91
                                                         907.59
                                                                        89.91
                                                                                    914.14
930.52
                                                                                                    89.82 917.42
                                                                                                                                89.8
                                             90.16
83.23
81.07
                                                                                  950.18
966.57
989.5
                                                                                                   87.13 953.46
   940.35
                  90.49
                              943.63
                                                        946.91
                                                                        89.01
                                                                                                                                85.4
                  84.2 960.01
81.05 979.67
81.06 999.33
                                                                                                               973.12
992.78
                                                                        82.48
                                                                                                    81.88
                                                                        81.02 989.5
80.25 1005.88
58.88 1039.44
   976.39
                                                        982.95
                                                                                                   80.63
                                             80.89 1002.61
63.93 1029.44
                                                                                                   78.83 1009.16
58.38 1059.44
   996.05
                  75.86 1019.44
  1012.44
                                                                                                                              58.78
                                                                       58.88 1039.44
58.88 1099.44
58.78 1149.44
60.18 1209.44
76.07 1245.23
83.9 1264.9
86.96 1281.3
92.36 1304.25
                                             59.18 1089.44
58.98 1139.44
60.78 1199.44
75.86 1241.95
83.02 1258.35
 1069.44
                  59.18 1079.44
59.08 1129.44
                                                                                                   59.18 1109.44
58.88 1159.44
                  59.88 1189.44
60.38 1238.67
81.72 1255.07
                                                                                                   59.88 1219.44
77.79 1248.51
84.7 1268.18
  1179.44
                                                                                                                              60.18
  1229.44
  1251.79
                                                                                                                              85.14
                  85.91 1274.74
89.59 1294.41
                                             86.52 1278.02
90.11 1300.97
                                                                                                   87.55 1287.86
93.04 1307.53
  1271.46
  1291.14
 1314.09
1333.76
                  93.01 1317.37
93.57 1337.04
                                             93.11 1320.65
93.7 1340.32
                                                                        93.33 1323.92
93.67 1343.6
                                                                                                   93.48 1330.48
93.84 1346.88
                                                                                                                              93.56
                                            93.7 1340.32
95.02 1356.71
96.49 1373.11
97 1396.06
97.13 1419.01
97.25 1448.52
97.42 1478.03
97.56 1500.99
                                                                                                   95.67 1363.27
96.53 1379.67
96.67 1405.9
97.46 1438.69
97.31 1468.2
97.27 1484.59
                                                                        95.4 1359.99
96.55 1376.39
96.98 1402.62
                  94.51 1353.43
96.22 1369.83
 1350.16
                                                                                                                              96.06
 1382.95
                  96.73 1392.78
                                                                                                                              96.66
                  96.92 1415.73
97.44 1445.24
97.41 1474.75
97.39 1497.71
 1412.46
                                                                        97.27 1425.57
97.14 1455.08
 1441.97
                                                                                                                               97.31
 1471 48
                                                                          97.3 1481.31
                                                                                                                              97 35
                                                                          97.6 1504.27
                                                                                                   97.54 1507.54
 1491.15
                                             95.41 1520.66
95.78 1546.89
97.15 1569.84
                  96.64 1517.38
95.69 1540.33
                                                                       94.95 1523.94
95.93 1550.17
                                                                                                   94.95 1527.22
95.97 1556.73
 1510.82
                                                                                                   96.83 1576.4
96.83 1615.75
98.13 1635.42
97.85 1655.1
98.31 1687.88
                  96.11 1566.56
                                                                        97.16 1573.12
 1560.01
                                                                                                                              96.76
                  96.78 1582.96
96.64 1622.31
                                             96.89 1596.08
96.98 1625.59
97.83 1645.26
98.01 1674.77
                                                                       96.99 1609.19
97.39 1632.14
97.78 1648.54
98.14 1684.61
 1619.03
                                                                                                                                98.1
 1638.7
1658.37
                  97.79 1641.98
98.02 1664.93
                                                                                                                              97.92
98.46
 1694.44
                  98.55 1704.28
                                             98.82 1707.56
                                                                        98.88 1710.84
                                                                                                   98.88 1714.12
                100.07 1720.67
                                                                       100.47 1730.51
                                           100.73 1746.91
103.89 1773.14
108.57 1789.53
                100.44 1743.63
102.58 1769.86
107.68 1786.25
                                                                      101.06 1750.18
104.7 1776.42
108.96 1792.81
                                                                                                 101.46 1760.02
105.42 1779.69
109.18 1799.37
 1737.07
                                                                                                                            102.16
 1763.3
1782.97
                                           109.06 1812.48
104.81 1838.72
102.56 1858.39
                109.2 1809.21
105.12 1828.88
                                                                      108.52 1819.04
104.21 1841.99
                                                                                                 106.53 1822.32
103.97 1845.27
 1805.93
                103.32 1855.11
102.57 1874.78
                                                                                                   102.5 1868.23
 1848 55
                                                                      102 48 1861 67
                                                                                                                              102.6
                                             102.6 1878.06
                                                                       102.51 1884.62
                                                                                                 102.21 1891.18
                101.86 1897.74
102.15 1923.97
100.94 1940.36
101.61 1969.87
102.04 1992.82
                                           102.6 1878.06
101.75 1901.01
101.93 1927.25
100.93 1946.92
101.57 1973.15
102.01 2005.94
                                                                                                 102.16 1907.57
101.57 1933.8
 1894.46
                                                                      101.78 1904.29
                                                                                                                             102.33
                                                                      101.82 1930.53
101.2 1953.48
                                                                                                 101.57 1933.8
101.35 1956.76
 1937.08
                                                                      101.46 1976.43
102.17 2019.06
101.71 2045.29
                                                                                                 101.51 1982.99
102.13 2022.34
 1963.31
  1989.55
                                                                                                                                  102
                101.83 2038.73
101.74 2058.4
101.64 2091.19
                                           101.77 2042.01
101.68 2064.96
101.67 2094.47
 2028 89
                                                                                                  101.71 2048.57
                                                                                                  101.39 2104.31
                                                                      101.62 2101.03
                                                                                                                            101.24
 2078.08
                                           101.42 2117.42
101.14 2146.93
                                                                      101.36 2120.7
101.22 2150.21
                101.18 2114.14
                                                                                                  101.24 2127.26
                                                                                                  101.18 2153.49
 2133.82
               101.12 2143.65
                                                                                                                             101.05
 2156.77 101.05 2160.05
                                             101.2 2169.89
                                                                      101.23 2173.16
                                                                                                  101.21
                                           num=
Manning's n Values
                                                              6
     Sta n Val Sta
0 .076 825.68
                                 Sta n Val
                                                              Sta
                                                                      n Val
                                              .076 861.72
                                                                          .066 1012.44
                                                                                                     .015 1238.67
                                                                                                                                .066
Bank Sta: Left Right 940.35 1294.41
                                  tht Lengths: Left Channel Right
41 2582.86 2000 4032.36
num= 1
                                                                                                    Coeff Contr.
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 940.35 90.49 T
                                           т
111.4
Left Levee Station= 111.4
Right Levee Station= 1805.93
                                                             Elevation= 115.66
Elevation= 109.2
Blocked Obstructions num=
Sta L Sta R Elev
                                                          1
   Sta L Sta R Elev
0 783.08 105.88
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft) 111.48

Vel Head (ft) 0.56

W.S. Elev (ft) 110.92

Crit W.S. (ft) 82.38

E.G. Slope (ft/ft) 0.000205

Q Total (cfs) 125000.00

Top Width (ft) 2064.54

Vel Total (ft/s) 4.09
                                                               Element
                                                                                                           Left OB Channel
                                                                                                                                               Right OB
                                                               Wt. n-Val.
Reach Len. (ft)
                                                                                                          0.071
2582.86
                                                                                                                            0.037
2000.00
                                                              Flow Area (sq ft)
Area (sq ft)
                                                                                                          5538.53
                                                                                                                           15044.83
                                                                                                                                                9983 10
                                                             Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
                                                                                                                            100463 40
                                                                                                            7218 29
                                                                                                                                                 17318 31
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                            1.30
                                                                                                                                 6.68
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                                                            42.49
7020841.0
                                                 52.54
                                       8735570.0
                                                                                                          504447.1
                                                                                                                                                 1210283.0
                                                               Wetted Per. (ft)
Shear (lb/sq ft)
                                      2351.91
58.38
                                                                                                           828.04
                                                                                                                              376.27
                                                                                                                                                 901.81
                                                                                                                               0.51
                                                                                                               0.09
                                                 2.17
0.54
                                                               Stream Power (lb/ft s)
Cum Volume (acre-ft)
   Alpha
                                                                                                               0 11
                                                                                                                                  3.41
                                                                                                                                                    0 25
   Frctn Loss (ft)
                                                                                                                            51526.19
                                                                                                                                             20728.90
   C & E Loss (ft)
                                                 0.12
                                                               Cum SA (acres)
                                                                                                        18214.59
                                                                                                                            2284.44
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
Note:
              Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
```

```
| Description: Bathymetric | Data | D
```

RS: 156.15

RIVER: Rio Grande REACH: Lower Reach

| 619.74 102.41 629.58 665.65 102.48 678.77 718.12 102.5 731.23 764.02 102.41 770.58 803.37 102.3 809.93 852.56 102.49 868.96 895.19 102.62 908.3 937.82 101.32 944.37 973.89 97.23 987 1009.96 92.9 1019.79 1072.26 93.65 105.66 1144.4 93.65 1150.96 1190.31 93.88 1200.14 1255.89 93.95 1269 1305.07 93.77 1314.91 1255.89 93.95 1269 1307.38 93.88 1373.93 1436.24 93.63 1446.07 1485.42 93.63 1446.07 1485.42 93.63 1446.07 1485.42 93.84 1721.52 1764.14 93.72 1773.98 1842.84 93.74 1855.96 1895.31 93.77 1678.89 1714.96 93.77 1678.89 1714.96 93.77 1773.98 1842.84 93.74 1855.96 1895.31 93.76 2010.08 2055.98 94.49 2062.54 1250.19 96.3 2124.84 2155.01 96.3 2124.84 2155.01 96.3 2124.84 2255.68 96.88 2295.35 2285.11 297.28 2560.96 2260.33 2551.12 277.39 2560.96 2600.33 275.23 275.68 96.88 2295.35 2288.88 2299.79 2356.96 2600.33 2551.33 2551.12 97.29 2560.96 2600.33 2551.33 2551.12 97.29 2560.96 2600.33 2555.11 297.28 2500.96 2600.35 2600.55 2 | 107.55 327.91 114.96 363.98 103.46 363.98 103.46 426.28 102.98 475.47 102.59 521.37 102.63 596.79 102.8 645.98 102.269 698.44 102.45 741.07 102.73 783.7 102.63 878.79 101.8 918.14 100.66 947.65 96.09 993.56 93.64 1042.75 93.75 1101.77 93.8 1206.7 93.8 1272.28 93.8 1321.47 93.65 1403.45 93.78 1272.28 93.8 1321.47 93.65 1403.45 93.78 1462.47 93.66 1511.66 93.71 1564.12 93.94 1629.7 93.88 1685.45 93.93 1787.1 93.57 1862.52 93.9 1914.98 93.9 1967.45 93.69 2456.03 97.5 2564.24 97.67 2233.05 96.79 2301.91 97.89 2351.1 96.95 2331.4 97.67 2187.15 97.09 2233.05 96.79 2301.91 97.89 2655.89 97.5 2564.24 97.27 2616.7 97.69 2655.89 97.5 2564.24 97.27 2616.7 97.69 2655.89 97.5 2564.24 97.77 3118.42 98.46 3000.35 97.81 3544.29 97.5 2718.35 97.67 2767.54 98.31 2839.68 98.06 3000.35 97.81 3544.29 97.5 2564.24 97.77 3118.42 98.46 3174.19 97.86 3220.12 97.73 3118.42 98.46 3174.19 97.86 3220.12 97.73 318.42 97.76 3603.98 98.18 3649.91 98.14 3682.79 98.84 377.13 10.49 3823.79 101.44 3856.6 99.78 3822.69 94.82 3771.3 10.59 3823.79 101.44 3856.6 99.78 3822.69 94.82 3771.3 10.59 3823.79 101.44 3856.6 99.78 3822.69 94.82 3771.3 10.59 3823.79 101.44 3856.6 99.78 3822.69 94.82 3771.3 10.59 3823.79 101.44 3856.6 99.78 3822.69 94.82 3771.3 10.49 4484.34 97.72 3416.97 98.73 3482.59 97.81 3544.92 97.76 3603.98 98.18 3649.91 98.14 3682.79 98.79 3823.79 101.44 3856.6 99.78 3822.69 97.88 3822.69 97.89 3823.79 101.44 4843.84 97.72 3416.97 98.77 3418.42 98.46 4677.71 104.91 4700.57 | 100.49 3895.97 93.02 3922.21 78.9 3955.02 67.33 4015.3 69.13 4086.3 70.03 4148.3 79.84 4164.54 82.31 4184.17 79.94 4210.35 87.51 4249.62 90.25 4315.07 91.63 4360.89 89.84 4436.09 93.2 4498.13 98.93 4560.17 103.28 4632 108.65 4680.98 103.54 4707.1 n Val Sta 3958.3 channel Right 000.04 2300 | 100.23 3840.19 99.54 3869.72 101.02 3899.25 88.88 3925.49 75.73 3958.3 67.83 4029.3 68.03 4100.3 70.25 4151.45 81.54 4167.81 80.03 4187.45 81.34 4220.17 87.8 4262.71 90.17 4328.16 91.34 4367.43 89.86 4458.95 94.37 4520.99 101.18 4566.7 105.55 4645.06 108.35 46645.06 108.35 4664.24 103.37 4716.9 | 100.72
87.28
75.66
67.93
68.33
75.66
82.87
79.47
83.82
88.25
90.27
89.93
89.63
96.86
101.77
106.53
102.61 | |
|--|--|---|---|---|---|
| Sta L Sta R Elev
0 3895.97 101.02
4351.07 4716.9 91.63
Left Levee Station=
Right Levee Station= | Permanent
T
T
363.98 Ele
4677.71 Ele | vation= 115.1
vation= 108.65 | | | |
| CROSS SECTION OUTPUT Pro | file #Design Flo | w | I aft OD | Ob 1 | Disk OD |
| E.G. Elev (ft) Vel Head (ft) W.S. Elev (ft) Crit W.S. (ft) E.G. Slope (ft/ft) Q Total (cfs) Top Width (ft) | 0.17 Wt.
110.66 Rea
91.61 Flo
0.000255 Are
125000.00 Fl
4348.38 Top | n-Val. ch Len. (ft) w Area (sq ft) a (sq ft) ow (cfs) Width (ft) | 0.066
2250.00
33046.21
46848.41
52698.58
3527.45 | 0.053
2000.04
14493.75
14493.75
63514.45
455.10 | 0.066
2300.00
4512.17
4696.35
8786.98
365.83 |

| Vel Total (ft/s) | 2.40 | Avg. Vel. (ft/s) | 1.59 | 4.38 | 1.95 |
|-------------------|-----------|------------------------|-----------|-----------|-----------|
| Max Chl Dpth (ft) | 43.33 | Hydr. Depth (ft) | 9.37 | 31.85 | 12.33 |
| Conv. Total (cfs) | 7833172.0 | Conv. (cfs) | 3302376.0 | 3980157.0 | 550639.1 |
| Length Wtd. (ft) | 2149.37 | Wetted Per. (ft) | 3533.80 | 473.19 | 375.85 |
| Min Ch El (ft) | 67.33 | Shear (lb/sq ft) | 0.15 | 0.49 | 0.19 |
| Alpha | 1.92 | Stream Power (lb/ft s) | 0.24 | 2.13 | 0.37 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 129458.10 | 50848.08 | 164645.80 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 18085.64 | 2265.87 | 20670.84 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 155.7

| REACH: Lo | wer Read | ch | RS: 155 | 5.7 | | | | | |
|------------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| INPUT | _ | | | | | | | | |
| Descripti
Station E | | | elevationum= | | lated fi | rom IBWC | 2008 Cr | oss-secti | .ons |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0
26.23 | 114.87
103.26 | 13.12
39.35 | 115.01
103.28 | 16.4
49.19 | 113.63
102.62 | 19.67
55.75 | 107.13
103.36 | 22.95
81.98 | 103.65
102.99 |
| 95.1 | 103.01 | 108.21 | 102.46 | 121.33 | 102.34 | 127.89 | 102.58 | 147.56 | 102.29 |
| 200.03
259.06 | 102.24
102.25 | 209.87
278.73 | 102.03
102.23 | 226.26
288.57 | 102.4
102.09 | 239.38
298.41 | 102.12
102.23 | 252.5
311.52 | 102.44
102.09 |
| 341.03 | 102.32 | 347.59 | 102.23 | 367.27 | 102.4 | | 102.23 | 400.06 | 102.22 |
| 409.9 | 101.89 | 416.46 | 102.1 | 439.41 | 102.11 | 449.25 | 102.4 | 468.92 | 102.05 |
| 478.76
544.34 | 102.34 | 485.32
560.74 | 102.07
101.41 | 498.44
570.58 | 102.31
99.81 | 508.27
583.69 | 101.96
98.85 | 534.51
596.81 | 102.04
97.18 |
| 606.65 | 96.17 | 629.6 | 95.01 | 649.28 | 95.18 | 659.12 | 94.83 | 682.07 | 94.98 |
| 688.63
773.89 | 94.42
94.01 | 701.75
790.28 | 94.44
93.74 | 718.14
813.24 | 94.21
93.89 | 731.26
826.35 | 94.22
93.83 | 744.37
849.31 | 93.87
94.13 |
| 862.43 | 94.03 | 875.54 | 94.34 | 882.1 | 94.08 | 901.78 | 94.14 | 908.33 | 94.33 |
| 931.29 | 94.18 | | 93.94 | 950.96
1046.06 | 94.19 | 967.36 | 94.03 | 980.48 | 94.2 |
| 1006.71
1118.2 | | 1032.94
1128.04 | 93.99 | 1134.6 | | 1059.18
1160.83 | | 1095.25
1167.39 | 93.68
93.49 |
| 1187.07 | 93.42 | 1210.02 | 93.48 | 1223.14 | 93.4 | 1278.88 | 93.6 | 1298.56 | 93.4 |
| 1331.35
1433.01 | | 1347.75
1446.12 | | 1380.54
1452.68 | | 1400.21
1462.52 | | 1423.17
1472.36 | 93.45
93.86 |
| 1478.92 | | 1492.03 | | 1505.15 | | 1518.27 | | 1531.38 | 93.76 |
| 1554.34 | | 1564.17 | | 1574.01 | | 1593.69 | | | 93.72 |
| 1613.36
1698.62 | | 1646.16
1715.02 | | 1655.99
1721.58 | 93.92 | 1675.67
1744.53 | 93.74 | 1682.23
1760.93 | 93.8
93.93 |
| 1797 | 94 | 1810.12 | 94.24 | 1823.23 | 93.95 | 1836.35 | 93.94 | 1856.02 | 94.15 |
| 1878.98
2013.43 | | 1905.21 | | 1918.33
2042.94 | 94.11
94.59 | 1947.84 | 94.48 | 1970.8
2069.17 | 94.29
94.53 |
| 2013.43 | 94.41
94.67 | 2033.1
2105.24 | | 2115.08 | 94.7 | 2049.5
2138.04 | | 2154.43 | 95.1 |
| 2170.83 | 94.65 | 2203.62 | 94.97 | 2216.74 | 94.84 | 2226.58 | 94.96 | 2246.25 | 94.8 |
| 2272.48
2338.07 | | 2279.04
2354.47 | | 2292.16
2357.74 | | 2305.28
2387.26 | | 2328.23
2393.82 | 95.28
94.78 |
| 2416.77 | | 2439.73 | | 2459.4 | 94.24 | 2475.8 | | 2498.75 | 95.2 |
| 2508.59 | | 2534.82 | | 2547.94 | | 2597.13 | 95.47 | 2616.8 | 95.45 |
| 2639.76
2702.06 | 95.64
95.66 | 2652.87
2711.9 | | 2669.27
2721.74 | | 2675.83
2744.69 | | 2688.95
2761.09 | 95.75
96.19 |
| 2790.6 | | 2810.28 | | 2813.56 | | 2856.19 | | 2866.02 | 96.1 |
| 2892.26 | | 2915.21 | 96.03 | 2928.33 | | 2938.17 | | 2964.4 | 96.37 |
| 2970.96
3105.41 | 96.14
95.81 | 2980.8
3128.36 | | 2997.19
3148.04 | | 3039.82
3190.67 | | 3072.61
3220.18 | 95.93
95.92 |
| 3256.25 | | 3272.65 | | 3292.32 | | 3315.28 | | 3331.67 | 96.08 |
| 3348.07 | | 3380.86 | | 3403.82 | | 3413.65 | | 3420.21 | 96.12 |
| 3436.61
3548.1 | | 3446.45
3571.06 | | 3466.12
3580.89 | | 3495.63
3633.36 | | 3521.87
3646.48 | 96.49
96.47 |
| 3662.87 | 96.69 | 3695.67 | | 3715.34 | | 3728.46 | 97.49 | 3738.3 | 98.8 |
| 3744.85 | | 3751.41 | | 3757.97 | | 3761.25 | | 3767.81 | 97.8 |
| 3777.65
3823.56 | | 3787.48
3843.23 | | 3794.04
3849.79 | 96.75
96.95 | 3800.6
3869.46 | | 3807.16
3882.58 | 96.65
96.05 |
| 3905.54 | | 3918.65 | 95.74 | 3931.77 | 95.84 | 3944.89 | 95.46 | 3958 | 94.7 |
| 3980.96 | | 4013.75 | | 4020.31 | | 4033.43 | 92.26 | 4053.1 | 91.01 |
| 4062.94
4112.13 | 88.01 | 4072.78
4118.69 | | 4089.17
4128.52 | | 4102.29
4141.64 | | 4105.57
4154.76 | 89.22
89.44 |
| 4161.31 | 90.46 | 4164.59 | 90.34 | 4177.71 | 87.63 | 4187.55 | 85.06 | 4197.39 | 83.74 |
| 4203.94
4240 | 81.89
71.24 | 4213.78
4260 | 75.66
70.64 | 4217.06
4270 | 75.5
70.64 | 4220
4290 | 70.94
69.64 | 4230
4300 | 70.94
69.64 |
| 4310 | 69.14 | 4340 | 69.14 | 4350 | 68.64 | 4360 | 68.64 | 4370 | 69.64 |
| 4380 | | 4384.29 | 75.5 | 4387.56 | | 4394.12 | 78.87 | 4403.95 | 83.01 |
| 4410.51
4462.95 | | 4413.78
4469.51 | | 4423.62
4492.45 | | 4430.17
4502.28 | | 4433.45
4515.4 | 100.52 |
| 4531.78 | | 4548.17 | 99.93 | | | 4580.95 | | 4594.06 | 100.03 |
| 4633.39 | | 4643.23 | | 4653.06 | | 4672.73 | | | 98.48 |
| 4695.67
4761.22 | | 4702.23
4774.34 | | 4718.61
4790.72 | | 4728.45
4810.39 | | 4738.28
4830.06 | 97.75
96.95 |
| 4843.17 | 96.54 | 4859.56 | 96.5 | 4872.67 | 96.76 | 4912 | 96.25 | 4941.5 | 96.17 |
| 4961.17 | | 4974.28 | | 4997.22 | | 5003.78 | | 5033.28
5128.33 | 95.54 |
| 5072.61
5174.22 | | 5082.44
5180.77 | | 5108.66
5210.27 | | 5121.78
5279.11 | | 5305.33 | 95.31
95.51 |
| 5351.22 | 95.18 | 5361.05 | 95.36 | 5380.72 | 95.28 | 5403.66 | 95.44 | 5410.22 | 95.66 |
| 5416.77
5488.88 | | 5429.88
5501.99 | | 5452.83
5538.05 | 95.56
95.46 | 5459.38
5544.6 | | 5482.33
5557.71 | 95.43
95.39 |
| 5583.94 | | 5606.88 | | 5613.44 | | 5626.55 | | 5642.94 | 95.51 |
| 5656.05 | | 5665.88 | 95.42 | 5678.99 | 95.45 | 5731.43 | 95.38 | 5803.54 | 95.41 |
| 5846.15
5980.54 | | 5885.49
6029.71 | | 5924.82
6039.54 | | 5937.93
6069.04 | | 5977.26
6124.76 | 95.49
95.44 |
| 6137.87 | | 6144.43 | | 6154.26 | | 6170.65 | | 6180.48 | 95.49 |
| 6229.65 | | 6259.15 | | 6308.32 | 95.5 | 6321.43 | | 6350.93 | 95.55 |
| 6416.48
6508.26 | 95.45
95.93 | 6429.59
6531.2 | | 6468.92
6541.03 | | 6488.59
6554.15 | | 6498.42
6586.92 | 95.54
95.52 |
| 6609.87 | 95.72 | 6616.42 | 95.47 | 6632.81 | 95.44 | 6649.2 | 95.64 | 6678.7 | 95.47 |
| 6688.53 | | 6695.09 | | 6704.92 | | 6721.31 | | 6744.25 | 95.47 |
| 6780.31
6839.31 | | 6799.98
6865.53 | | 6806.53
6872.09 | | 6813.09
6881.92 | | 6822.92
6895.03 | 95.47
101.87 |
| 6901.59 | 102.73 | 6908.14 | 102.72 | 6924.53 | 103.34 | 6940.92 | 103.05 | 6990.08 | 103.2 |
| 6996.64 | | 7006.47
7085.14 | | 7013.03 | | 7019.58 | | 7049.08
7137.58 | 103.37 |
| 7065.47
7147.42 | | 7153.97 | 102.47 | 7094.97
7170.36 | | 7124.47
7176.92 | | 7183.47 | 102.33
102.39 |
| 7212.97 | 102.78 | 7226.08 | 103.73 | 7232.64 | 104.6 | 7239.19 | 104.59 | 7249.03 | 103.79 |
| 7281.8
7367.02 | | 7288.36
7383.41 | | 7317.86
7386.69 | | 7327.69
7396.52 | 104
106.91 | 7357.19
7399.8 | 103.91
108.57 |
| 7406.36 | | 7409.63 | | 7412.91 | | 7426.02 | | 7455.52 | 115.62 |
| | | | | | | | | | |

```
7475.19 116.27 7485.02 116.46 7504.69 115.99 7527.63 116.19 7540.74 116.42 7557.13 117.16 7576.8 116.66 7586.63 116.75 7593.19 117.61 7603.02 117.06 7616.13 117.12 7622.69 116.15 7635.8 115.19 7642.35 114.98 7645.63 114.2
  7671.85 110.22 7678.41 108.45 7681.69 108.09 7688.24 106.59 7707.91 106.59
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .092 3751.41 .066 4213.78 .015 4403.95
                                                                                                            n Val Sta
.066 4433.45
Bank Sta: Left Right 4161.31 4433.45

Ineffective Flow num 1 22226.15 2050 2058.78

Ineffective Flow num 1

Sta L Sta R Elev Permanent 0 4161.31 90.46 T

Left Levee Station 13.12 Elevation 115.01

Right Levee Station 7593.19 Elevation 117.61

Blocked Obstructions num 2

Sta L Sta R Elev Sta L Sta R Elev 0 3744.85 99.38 4433.45 7707.91 100.52
                                                                                                                 .1
CROSS SECTION OUTPUT Profile #Design Flow
                                                                     Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
                                            110.44
   E.G. Elev (ft)
Vel Head (ft)
                                                                                                                      Left OB
                                                                                                                                           Channel
                                                                                                                                                                Right OB
                                                                                                                    0.086
2226.15
45774.34
                                                                                                                                               0.035
   Vel Head (ft) 0.15
W.S. Elev (ft) 110.30
Crit W.S. (ft) 95.25
E.G. Slope (ft/ft) 0.000128
Q Total (cfs) 125000.00
Top Width (ft) 7384.21
                                                                                                                                                                2058.78
                                                                                                                                           2050.00
                                                                                                                     45944.09
                                                                                                                                           9353.69
                                                                                                                                                              27596.17
                                                                                                                      45081.69
4143.23
                                                                                                                                           45726.72
272.14
                                                                                                                                                                34191.59
   Top Width (ft)
Vel Total (ft/s)
                                                                                                                                                                2968.84
                                                                                                                                                                 1.24
                                                                                                                      0.98
                                                       1.51
                                                                                                                                               4 89
                                                  41.66
   Max Chl Dpth (ft)
                                          11040620.0
2114.39
                                                                                                                     3981839.0 4038810.0
4147.91 286.45 29
0.09 0.26
   Conv. Total (cfs)
Length Wtd. (ft)
                                                                      Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                                      3019970.0
                                                                                                                                                             2970.88
                                                                      Wetted Per. (LC, Shear (lb/sq ft) 0.09 Stream Power (lb/ft s) 0.09 Cum Volume (acre-ft) 127061.60 Cum Volume (acre-ft) 17887.54
                                                                                                                                                                  0.07
   Min Ch El (ft)
                                                    68.64
                                                       4.17
                                                                                                                    0.09
127061.60
                                                                                                                                                 1.28
   Frctn Loss (ft)
                                                                                                                                           50300.61
                                                                                                                                                                163793.30
   C & E Loss (ft)
                                                      0.01
                                                                    Cum SA (acres)
                                                                                                                                           2249.17
                                                                                                                                                             20582.80
                 Manning's n values were composited to a single value in the main channel.
Note:
```

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 155.36 REACH: Lower Reach

| INPUT | | | | | | | | | |
|--------------------|----------------|--------------------|-----------------|--------------------|-----------------|--------------------|-----------------|--------------------|-----------------|
| Descripti | | | | | lated fr | rom IBWC | 2008 Cr | oss-secti | .ons |
| Station E | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 114.01 | 3.28 | 114.44 | 16.4 | 114.47 | 19.68 | 114.15 | 26.23 | 102.74 |
| 29.51 | 101.89 | 45.91
95.1 | 101.62
98.23 | 55.75 | 104.12
97.36 | 59.03 | 104.26
95.77 | 68.86
134.45 | 103.15
95.42 |
| 78.7 | 101.56 | | | 101.65 | | 121.33 | | | |
| 150.84 | 95.46 | 163.96 | 94.89 | 177.08 | 94.95 | 193.47 | 95.32 | 203.31 | 94.97 |
| 216.43 | 95.39 | 226.26 | 94.93 | 252.5 | 95.53 | 265.61 | 95.28 | 272.17 | 95.61 |
| 291.85
403.34 | 95.36
96.54 | 318.08 | 96.03
96.93 | 324.64
439.41 | 95.87
96.8 | 350.87
445.97 | 96.06
97.14 | 396.78
459.09 | 96.72
97.07 |
| 485.32 | 97.24 | 416.46
501.72 | 97.13 | 518.11 | 97.85 | 524.67 | 97.62 | 531.23 | 98.03 |
| 550.9 | 97.62 | 564.02 | 98.01 | 570.58 | 97.86 | 586.98 | 98.25 | 603.37 | 99.82 |
| 619.77 | 103.12 | 632.88 | 104.62 | 636.16 | 104.56 | 646 | 103.27 | 652.56 | 102.78 |
| 672.23 | 100.67 | 688.63 | 100.06 | 737.82 | 99.83 | 773.89 | 99.96 | 836.19 | 99.63 |
| 842.75 | 99.85 | 852.59 | 99.6 | 878.82 | 99.61 | 905.06 | 100.06 | 921.45 | 99.5 |
| 928.01 | 99.94 | 954.24 | 99.52 | 973.92 | 99.71 | 983.76 | | 1009.99 | 99.7 |
| 1026.38 | | 1032.94 | | 1059.18 | | 1088.69 | | 1098.53 | 99.72 |
| 1111.64 | 99.58 | 1134.6 | | 1147.72 | | 1154.27 | | 1183.79 | 99.72 |
| 1206.74 | | 1219.86 | | 1239.53 | | 1252.65 | | 1259.21 | 102.65 |
| 1275.61 | | 1282.16 | | 1288.72 | | 1298.56 | | 1311.68 | 100.69 |
| 1328.07 | | 1347.75 | | 1360.86 | 98.98 | 1370.7 | | 1380.54 | 98.99 |
| 1400.22 | | 1406.77 | | 1436.29 | | 1446.12 | | 1452.68 | 99.3 |
| 1475.64 | | 1518.27 | | 1528.11 | | 1557.62 | | 1590.41 | 99.69 |
| 1600.25 | 99.34 | 1613.36 | 99.56 | 1646.16 | 99.42 | 1665.83 | 99.8 | 1672.39 | 100.36 |
| 1682.23 | | 1688.79 | | 1698.62 | | 1708.46 | | 1728.14 | 99.78 |
| 1741.25 | | 1754.37 | 100.25 | 1760.93 | 99.59 | 1770.77 | 100.13 | 1783.88 | 99.81 |
| 1790.44 | 100.07 | 1810.12 | 99.76 | 1819.96 | 99.88 | 1823.23 | 100.38 | 1846.19 | 100.31 |
| 1852.75 | 99.47 | 1869.14 | 99.6 | 1875.7 | 99.22 | 1898.66 | 99.65 | 1921.61 | 98.94 |
| 1934.73 | 99.02 | 1941.29 | 98.7 | 1964.24 | 98.98 | 1987.2 | 99.5 | 2010.15 | 99.31 |
| 2033.11 | 99.41 | 2049.5 | 99.82 | 2072.46 | 99.42 | 2088.85 | 99.86 | 2105.25 | 99.6 |
| 2131.48 | 99.66 | 2170.83 | 99.37 | 2190.5 | 98.97 | 2210.18 | 98.29 | 2226.57 | 98.07 |
| 2233.13 | | 2259.37 | | 2275.76 | | 2295.44 | | 2318.39 | 95.55 |
| 2324.95 | | 2357.74 | | 2383.97 | 94.7 | | | 2452.83 | 94.86 |
| 2469.23 | | 2531.53 | | 2590.56 | | 2672.54 | | 2692.21 | 95.44 |
| 2705.33 | 95.21 | 2725 | | 2757.79 | | 2790.59 | | 2797.14 | 95.36 |
| 2810.26 | | 2849.61 | | 2869.29 | | 2892.24 | | 2905.36 | 96.3 |
| 2911.91 | | 2921.75 | | 2941.43 | | 2954.54 | | 2964.38 | 92.2 |
| 2977.5 | | 2997.17 | | 3013.57 | | 3043.08 | | 3066.03 | 92.14 |
| 3098.83 | 92.35 | 3118.5 | | 3141.45 | | 3151.29 | | 3177.52 | 92.59 |
| 3187.36 | | 3210.32 | | 3223.43 | | 3239.83 | | 3249.67 | 92.78 |
| 3262.78 | | 3298.85 | | 3334.92 | | 3380.83 | | 3400.51 | 93.75 |
| 3410.34 | 93.59 | 3433.3 | | 3446.41 | | 3492.32 | | 3538.23 | 94.17 |
| 3554.63 | | 3567.74
3656.28 | | 3597.26
3675.95 | 94.53 | 3620.21
3689.07 | | 3630.05
3698.91 | 94.68
95.7 |
| 3646.44
3712.02 | | 3757.93 | | 3761.21 | | 3777.61 | | 3784.17 | 95.69 |
| 3712.02 | 96.28 | 3810.4 | | 3813.68 | | 3830.07 | | 3843.19 | 94.11 |
| 3856.31 | | 3869.42 | | 3875.98 | | 3885.82 | | 3892.38 | 92.94 |
| 3898.94 | | 3928.45 | | 3938.29 | | 3944.84 | 89.28 | 3951.4 | 85.26 |
| 3964.52 | | 3977.64 | | 3980.91 | | 3984.91 | | 4004.91 | 70.15 |
| 4017.91 | | 4029.91 | | 4042.91 | | 4055.91 | | 4069.91 | 70.15 |
| 4083.91 | | 4108.91 | | 4130.91 | | 4184.23 | | 4190.79 | 75.85 |
| 4197.35 | | 4210.46 | 83.54 | 4220.3 | | 4230.14 | | 4239.98 | 93 |
| 4253.1 | | 4305.57 | | 4325.25 | | 4344.92 | 99.55 | 4364.6 | 99.71 |
| 4384.28 | | 4394.11 | | 4400.67 | | 4430.19 | | 4440.03 | 98.94 |
| 4449.87 | | 4462.98 | | 4472.82 | | 4479.38 | | 4495.78 | 98.03 |
| 4502.34 | | 4531.85 | | 4551.53 | | 4558.09 | | 4574.48 | 97.96 |
| 4590.88 | 98.06 | 4600.72 | 98.38 | 4640.07 | 98.65 | 4649.91 | | 4656.47 | 99.26 |
| 4679.43 | | 4705.66 | | 4712.22 | 98.23 | 4731.9 | | 4745.02 | 98.17 |
| 4761.41 | 97.52 | 4767.97 | 97.64 | 4781.09 | 96.93 | 4797.49 | 96.56 | 4836.84 | 96.36 |
| 4866.36 | 95.84 | 4915.55 | 95.74 | 4938.5 | | 4974.58 | 95.43 | 5004.09 | 95.49 |
| 5010.65 | 95.31 | 5069.68 | 95.08 | 5076.24 | 95.42 | 5086.08 | 95.14 | 5109.04 | 94.94 |
| 5125.43 | 95.04 | 5148.39 | 94.82 | 5161.51 | 95.01 | 5174.63 | 94.91 | 5184.46 | 95.23 |
| 5194.3 | 94.88 | 5213.98 | 95.19 | 5223.82 | 94.86 | 5246.77 | 95.18 | 5253.33 | 94.96 |
| | | | | | | | | | |

```
95.14 5318.92
                                                                                                              94.8 5381.23
                                                                                  5466.5
   5453.38
                           95.23 5463.22
95.52 5518.97
                                                                   96.54
                                                                                                           96.58 5486.17
95.42 5578
                                                                                                                                                   95.66 5496.01
                                                                                                                                                                                           95.91
95.55
                                                                                                           95.42 5578
96.17 5751.81
                              95.5 5679.66
   5630.47
                                                                   96.08 5696.06
                                                                                                                                                    97.45 5758.37
                                                                                                                                                                                            97.87
   5768.21
                           97.89 5784.6
                                                                   98.35
                                                                                          5801
                                                                                                             98.1 5814.12
                                                                                                                                                    98.44 5823.96
                            98.38 5892.83
                                                                   98.66 5899.39
   5856.75
                                                                                                           98.53 5938.74
                                                                                                                                                   98.36 5974.81
                           98.32 6033.84
97.71 6158.46
                                                                   98.01 6046.96
97.36 6187.98
                                                                                                           98.36 6069.92
97.45 6220.77
                                                                                                                                                   98.01 6083.04
97.06 6230.61
   6109.27
                         96.74 6312.6
98.17 6492.97
100.07 6630.71
     6279.8
                                                                   96.71 6358.51
98.89 6506.09
                                                                                                           96.49 6388.03
                                                                                                                                                   96.57 6466.73
                                                                 101.94 6643.82
102.67 6722.53
105.68 6791.4
                                                                                                                                                104.41 6673.34
103.23 6748.77
105.89 6830.75
   6614.31
                                                                                                         104.08 6653.66
                         103.08 6712.69
104.49 6781.56
                                                                                                         103.54 6732.37
106.11 6814.36
   6771.72
                                                                                                                                                                                            103.7
                                                                104.24 6879.94
105.23 6916.02
                                                                                                                                                103.33 6896.34
102.79 6942.25
   6847 15
                         104.53 6870.11
                                                                                                         104.95 6889.78
                         105.36 6909.46
                                                                                                         103.62 6925.86
   6906.18
                        102.69 6971.77
102.19 7086.55
102.21 7201.33
102.79 7286.6
103.23 7355.47
                                                                102.5 6994.73
102.65 7122.62
102.27 7221.01
103 7299.72
103.36 7371.86
   6952.09
                                                                                                        102.61 7004.56
102.82 7148.86
                                                                                                                                                102.86 7020.96
102.59 7165.26
                                                                                                       102.02
102.84 7253.0
103.59 7309.55
102.59 7381.7
                                                                                                                                                102.66 7263.64
103.63 7316.11
103.2 7388.26
   7188.21
   7273.48
7348.91
                                                                                                                                                                                            102.7
                        103.23 7333.47
102.79 7434.17
103.49 7509.6
102.73 7568.63
102.65 7644.06
   7421.06
7473.53
                                                                102.59 7444.01
103.54 7519.44
                                                                                                        103.38 7453.85
103.69 7532.56
                                                                                                                                                103.63 7460.41
103.33 7545.67
                                                                                                                                                                                        103 16
                                                                103.54 7519.44
102.56 7575.19
103.68 7650.62
102.52 7752.28
102.42 7817.87
102.96 7873.62
                                                                                                        102.16 7598.15
103.7 7660.46
                                                                                                                                                101.93 7617.82
102.53 7689.97
   7552 23
   7634.22
                         102.92 7729.32
                                                                                                        102.49 7765.4
103.41 7827.71
102.82 7890.02
   7712.93
                                                                                                                                                  102.8 7775.24
                                                                                                                                                                                        102.46
                        103.68 7860.5
103.38 7926.09
102.34 7991.68
   7847.38
                                                                                                                                                 103.21 7899.86
                                                                                                                                                                                         102.98
                                                                                                       102.82 7890.02
102.28 7949.05
103.46 8021.2
110.86 8073.67
                                                                                                                                                102.43 7968.72
106.27 8024.48
   7912.97
                                                                103.11 7935.93
103.21 8001.52
   7981.84
  8031.03 111.51 8037.59
8090.06 103.78 8103.18
                                                               111.84 8060.55
103.19 8113.02
                                                                                                                                                110.76 8080.23
                                                                                                            99.19 8119.58
                                                                                                                                                    98.39 8303.24
                                                                 99.83 8319.63 103.02 8329.47 104.34 8368.82 104.79
   8306.52 98.42 8313.07
                     s n Values num= 6
n Val Sta n Val Sta
.066 3777.61 .07 3980.91
 Manning's n Values
                                                                                                                                                      .07 4325.25
                                                                                                            .025 4230.14
  7644 06
Bank Sta: Left Right Lengths: Left Channel 3777.61 4325.25 1101.32 1093.11
| Signature | Section | Se
                                                                                                                                                  Coeff Contr. Expan.
Left Levee Station= 16.4
Right Levee Station= 8037.59
                                                                                              Elevation= 114.47
                                                                                         Elevation= 111.84
CROSS SECTION OUTPUT Profile #Design Flow
                                                                110.24
     E.G. Elev (ft)
                                                                                                                                                              Left OB
                                                                                                                                                                                        Channel
                                                                                                                                                                                                                    Right OB
                                                                                              Element
                                                                                             Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
    Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                                                                                                           0.066
                                                                                                                                                                                        0.030
1093.11
                                                                                                                                                           44956 25
                                                                                                                                                                                      14130.11
                                                                                                                                                                                                                   33470 82
                                                                                                                                                             43249.92
     Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                125000.00
                                                                                                 Flow (cfs)
                                                                                                                                                                                        54767.16
                                                                                                                                                                                                                    26982.92
                                                                                             Top Width (ft)
                                                                        1.35
                                                                                              Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                                                                  0.96
                                                                                                                                                                                              3.88
                                                                                                                                                                                                                            0.81
     Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                        40 48
                                                                                                                                                                  11 97
                                                                                                                                                                                             25 80
                                                                15286490.0
                                                                                             Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                                                                                                5289118.0
                                                                                                                                                                                              6697583.0
                                                                                                                                                                                                                            3299794.0
                                                                   1093 87
                                                                                                                                                             3763.38
                                                                                                                                                                                         559.15
                                                                                                                                                                                                                     3707.36
                                                                                                                                                                                           0.11
     Min Ch El (ft)
                                                                                              Stream Power (lb/ft s)
     Alpha
                                                                          3.86
                                                                                                                                                                     0.05
                                                                                                                                                                                                0.41
                                                                                                                                                                                                                            0.03
                                                                                            Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                                                                                                         49748.02
                                                                                                                                                                                                                20425.12
                                                                                                                                                          17685.70
                                                                                                                                                                                        2229.88
     C & E Loss (ft)
                                                                         0.02
```

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 155.2

Description: RGV-04, New Cross-section, Updated on left with new survey to Station 1357.76, Bathymetric elevations translated from IBWC 2008 Cross-sections

| Station E | levation | n Data | num= | 406 | | | | | |
|-----------|----------|---------|--------|---------|--------|---------|--------|---------|--------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 107.92 | 13.99 | 111.5 | 41.99 | 113.37 | 65.99 | 113.8 | 93.98 | 112.79 |
| 117.98 | 101.16 | 144.97 | 98.9 | 177.97 | 98.88 | 191.97 | 101.59 | 221.96 | 101.98 |
| 252.96 | 101.73 | 325.94 | 101.74 | 428.93 | 102.03 | 436.92 | 102.4 | 503.91 | 101.37 |
| 517.91 | 99.15 | 524.91 | 95.42 | 547.9 | 92.64 | 578.9 | 94.69 | 624.89 | 94.83 |
| 664.88 | 94.17 | 698.88 | 94.96 | 756.87 | 95 | 807.86 | 94.6 | 844.85 | 94.75 |
| 893.84 | 96.67 | 934.83 | | 1088.81 | 97.86 | 1139.8 | | 1357.76 | 98.79 |
| 1358.2 | 98.93 | 1364.76 | 98.67 | 1387.73 | 98.67 | 1417.25 | 99.05 | 1423.81 | 98.79 |
| 1433.65 | 98.95 | 1450.06 | 98.75 | 1476.3 | 98.99 | 1486.15 | 98.8 | 1518.95 | 99.34 |
| 1528.79 | 98.84 | 1545.2 | 98.86 | 1581.29 | 99.11 | 1607.53 | 98.78 | 1623.93 | 98.81 |
| 1633.78 | 99.12 | 1640.34 | 98.9 | 1660.02 | 98.99 | 1689.55 | 98.89 | 1709.23 | 99.13 |
| 1722.35 | 98.93 | 1748.6 | 99.07 | 1765 | | 1781.41 | | 1797.81 | 99.01 |
| 1840.46 | | 1847.02 | 99.25 | 1863.42 | 99.09 | 1879.83 | 99.25 | 1906.07 | 99.15 |
| 1919.19 | 99.88 | 1929.04 | 99.2 | 1942.16 | 99.49 | 1948.72 | 99.2 | 1965.12 | 99.31 |
| 1974.97 | 99.07 | 1984.81 | 99.46 | 2001.21 | | 2007.77 | | 2034.02 | 99.1 |
| 2066.83 | 99.23 | 2083.23 | 99.41 | 2099.63 | 99.15 | 2106.19 | 99.3 | 2152.12 | 99.15 |
| 2198.05 | 99.39 | 2217.74 | 99.23 | 2273.51 | 99.37 | 2293.19 | 99.74 | 2303.03 | 99.72 |
| 2326 | 100.19 | 2358.81 | 100.32 | 2378.49 | 99.88 | 2385.05 | 100.01 | 2394.89 | 99.7 |
| 2427.7 | 99.74 | 2447.38 | 99.96 | 2467.07 | 99.95 | 2480.19 | 100.24 | 2490.03 | 99.79 |
| 2522.84 | 99.84 | 2542.52 | 99.68 | 2565.49 | 99.86 | 2585.17 | 100.38 | 2598.3 | 100.15 |
| 2614.7 | | 2621.26 | | 2640.95 | | 2657.35 | 99.83 | 2696.72 | 99.85 |
| 2729.52 | 100.02 | 2749.21 | 99.91 | 2762.33 | 99.61 | 2778.73 | 100 | 2785.3 | 99.9 |
| 2798.42 | | 2804.98 | | 2837.79 | | 2844.35 | 99.85 | 2870.59 | 99.6 |
| 2900.12 | 100.08 | 2909.96 | | 2923.08 | 100.65 | 2949.33 | 97.07 | 2955.89 | 96.49 |
| 2972.29 | 94.39 | 3001.82 | 92.54 | 3014.94 | | 3021.5 | 91.83 | 3031.35 | 92.11 |
| 3047.75 | | 3123.21 | | 3126.49 | | 3182.26 | | 3198.66 | 92.31 |
| 3211.78 | 91.97 | 3247.87 | 92.3 | 3264.27 | 92.05 | 3290.52 | | 3346.29 | 92.23 |
| 3382.38 | 92.51 | 3392.22 | | 3415.19 | 92.61 | 3474.24 | 92.55 | 3533.29 | 92.69 |
| 3559.54 | | 3608.75 | | 3625.15 | | 3634.99 | | 3654.68 | 93.53 |
| 3690.76 | 94.31 | 3700.61 | 93.8 | 3710.45 | 94.49 | 3713.73 | 94.14 | 3723.57 | 91.96 |
| 3730.13 | | 3743.25 | | 3749.82 | | 3762.94 | | 3779.34 | 90.15 |
| 3785.9 | 90.4 | 3812.15 | 91.91 | 3825.27 | 92.04 | 3835.11 | 92.79 | 3838.39 | 92.46 |
| 3844.96 | 89.31 | 3851.52 | 84.68 | 3858.08 | 82.89 | 3864.64 | 82.13 | 3867.92 | 81.15 |
| | | | | | | | | | |

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70.85 3953.04
                                                                                             71.45 3966.04
71.35 4032.04
76.1 4087.73
                                          71.85 4004.04
71.63 4074.6
                                                                                                                       71.75
79.54
 3978.04
4057.04
                 71.85 3991.04
71.95 4071.04
                                                                    71.65 4018.04
                                          88.55 4117.25
 4097.57
                 84.06 4104.13
                                                                    95.92 4123.81
                                                                                             98.68 4127.09
                                                                                                                        99.5
 4133.66
                 99.94 4150.06
                                               99 4192.71
                                                                    99.46 4215.67
                                                                                              99.39 4225.51
                                                                                                                       99.01
                                          99.28 4310.81
 4251.76
                     99
                               4278
                                                                    99.16 4320.65
                                                                                              99.33 4337.05
                                                                                                                       98.81
                 98.61 4373.14
97.5 4422.35
                                          99.18 4382.98
97.18 4445.31
                                                                    99.12 4392.82
97.41 4487.96
                                                                                             97.87 4405.94
97.11 4530.61
 4360.02
 4412.51
                                                                                                                         96.7
                 96.56 4589.66
95.89 4661.83
95.37 4766.81
  4583.1
                                          96.37 4606.06
                                                                   96.48 4622.46
95.79 4697.92
                                                                                             96.08 4632.3
95.46 4720.88
                                           95.96 4688.07
                                                                    94.97 4789.77
 4743.84
                                           95.32 4773.37
                                                                                              94.65 4825.86
                 94.52 4871.79
94.08 4960.36
93.82 5065.34
                                          94.46 4875.07
93.88 4973.49
                                                                                             94.11 4930.84
93.84 5009.57
                                                                    94.34 4914.44
 4940.68
                                                                    94.15 4993.17
                                                                                                                       94.04
                                          93.92 5091.59
                                                                                             94.08 5144.08
93.91 5275.3
  5039 1
                                                                    93.89 5124.39
                                                                                                                       93 83
                 94.14 5163.76
                                          93.98 5183.44
                                                                    94.13 5199.85
 5153.92
                                                                                                                       94.05
                                          94.49 5347.47
94.37 5416.36
95.5 5616.48
95.73 5721.46
98.99 5862.52
 5321.23
                 94.22 5331.07
94.24 5406.52
                                                                   94.58 5367.16
94.14 5436.05
                                                                                             95.19 5377
94.08 5475.42
 5390.12
                                                                   95.73 5623.04
95.53 5777.23
99.72 5888.77
                 95.18 5557.43
95.58 5695.21
                                                                                             95.33 5636.16
95.72 5800.19
 5521.34
                                                                                            100.64 5895.33
 5829.72
                 97.12 5849.4
                                                                                                                     100.53
               101.02 5928.14
102.98 5974.06
                                         101.78 5941.26
103.22 5983.91
                                                                  101.47 5947.82
103.11 5993.75
                                                                                           100.72 5957.66
103.58 6006.87
 5915 01
 5964.22
               103.34 6019.99
103.23 6075.76
                                         104.04 6033.11
103.34 6088.88
                                                                  103.31 6042.96
102.96 6141.37
                                                                                           104.03 6056.08
102.94 6157.78
 6013.43
 6062.64
                                        102.67 6298.84
102.43 6387.42
102.5 6580.97
102.21 6689.23
102.14 6840.14
  6187.3
               102.88 6252.91
                                                                  102.72 6308.68
                                                                                            102.57 6334.93
                                                                                                                       102.6
                                                                 102.72 6308.68
102.21 6443.19
102.27 6597.38
102.28 6708.91
101.88 6856.54
                                                                                           102.57 6334.93
102.26 6485.84
102.43 6623.62
102.12 6728.6
101.98 6909.03
               102.46 6371.01
102.32 6538.32
 6498.96
                                                                                                                     102.46
 6630.18
6777.81
               102.33 6662.99
102.04 6784.37
               102.04 6784.37
102.2 6925.43
103.73 7010.73
99.73 7076.34
101.78 7155.07
102.89 7246.93
                                        103.24 6931.99
102.63 7027.13
 6915 59
                                                                  103.58 6958.24
                                                                                           104.29
                                                                                                        6964 8
                                                                  101.23 7036.97
                                                                                            101.5 7046.82
 7000.89
                                                                                                                     100.35
                                        100.03 7082.9
101.92 7161.64
103 7256.77
                                                                  100.85 7118.99
102.59 7174.76
102.49 7263.33
                                                                                            102.3 7132.11
102.68 7194.44
 7063.22
                                                                                           102.56 7283.02
101.59 7388
 7214.12
                                                                                                                     101.96
                                        103 /256.7/
101.74 7335.51
101.26 7440.49
101.65 7542.18
103.69 7614.36
102.88 7679.97
               101.66 7312.54
102.03 7417.52
101.27 7535.62
                                                                  101.61 7378.15
101.04 7453.61
 7299.42
                                                                                            101.46 7486.41
 7401.12
                                                                                           102.47 7584.83
102.34 7640.6
101.57 7709.49
                                                                  102.21 7568.43
103.04 7627.48
 7509 38
  7604.51
               103.61 7611.08
                                                                      102 7693.09
 7660.28
               103.04 7673.41
                                        102.88 7679.97
101.92 7739.02
102.82 7798.07
101.68 7850.56
101.32 7926.01
                                                                102.63 7745.58
102.63 7807.91
100.99 7863.68
101.47 7945.7
                           7725.9
               102.09 7725.9
103.32 7771.82
101.38 7844
101.92 7903.05
 7761.98
7837.44
                                                                                           103.08 7824.31
                                                                                                                     101.67
                                                                                           100.6 7870.24
101.22 7952.26
 7886.65
                 100.48 7978.5
102.8 8044.11
                                        101.33 7994.9
102.62 8057.24
                                                                  101.75 8001.47
102.79 8083.48
 7965.38
               100.48
                                                                                            102.21 8030.99
 8037.55
                                                                                            103.62 8090.04
               104.87 8109.73
110.19 8168.78
                                        111.18 8113.01
109.38 8175.34
 8093.32
                                                                  111.88 8122.85
                                                                                           112.19 8142.53
                                                                                                                     110.25
                                                                   109.8 8185.18
                                                                                           105.63 8195.02
                                        98.96 8214.71
104.87 8450.93
  8198.3
               104.22 8208.14
                                                                    98.23 8424.68
                                                                                             98.23 8427.96
               103.59 8441.09
                                                                  105.57 8480.46
 8496.86 106.07
Manning's n Values num=
       Sta n Val Sta
0 .066 3710.45
                                                                                                                      n Val
                                                          Sta
                                                                   n Val
                                                                                    Sta
                                                                                             n Val
                                            .07 3877.76
                                                                     .025 4117.25
                                                                                                .07 4133.66
 8109.73
                                         Lengths: Left Channel
                                                                                              Coeff Contr. Expan.
Bank Sta: Left
                          Right
                                                                              Right
                                         959.6
2
          3710.45 4133.66
                                                                956.88 939.12
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 3710.45 94.49
                           94.5.
99.94
'59=
                                         T
T
 4133.66 8496.86
                    Station= 65.99
Station= 8122.85
                                                           Elevation= 112.19
Right Levee
CROSS SECTION OUTPUT Profile #Design Flow
                                                            Element
                                                                                                                     Channel
                                                                                                                                      Right OB
                                                           Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                               0.06
                                                                                                       0.066
                                                                                                                        0.047
                                                                                                                                          0.066
  U.S. Elev (ft) 110.08
Crit W.S. (ft) 97.30
E.G. Slope (ft/ft) 0.000107
Q Total (cfs) 125000.00
Top Width (ft) 2007 20
                                                                                                                     956.88
                                                                                                                                      939.12
                                                           . (LC)
LIOW Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ff)
                                                                                                  959.60
43592.27
                                                                                                                   12212.26
                                                                                                                                      34998.65
                                                                                                                   12212.26
                                                                                                                                     42167.88
                                                                                                  45097.28
                                                                                                   53467.18 36730.33
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                        125000.00
                                                                                                                                       34802.49
                                                           Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                          8007.30
1.38
                                                                                                   3610.88
                                                                                                                       423.21
                                                                                                                                       3973.21
                                                                                                     1.23
                                                                                                                          3.01
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                       12.07
                                              39 23
                                                                                                                        28 86
                                                                                                                                           8 81
                                        12064350.0
                                                                                                      5160376.0
                                                                                                                         3545021.0
                                        953.61
                                                                                                                      435.42
                                                                                                                                       3976.48
                                                                                                    3615.59
                                                            Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                        0.08
                                                                                                                      0.19
   Min Ch El (ft)
                                              70.85
                                                                                                                                            0.06
  Alpha
                                               1.89
  Frctn Loss (ft)
C & E Loss (ft)
                                                           Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                                                      161174.30
                                               0 09
                                                                                                 123462.40
                                                                                                                     49417.49
                                                                                                                     2217.70
                                                                                                                                    20329.66
                                               0.02
                                                                                                  17592.58
             Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                       RS: 155.01
Description: RGV-04, Updated on left with new survey to Station 1494.75,
Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data num=
Sta Elev Sta Elev
                                                    464
                                        Elev
113.65
                                                       Sta
          0
              109.09
                                  9
                                                           20 114.75
                                                                             34.99
111.98
357.94
                                                                                          114.29
                                                                                           114.29 42.99
105.71 136.98
105.51 359.94
                                                                                                                    112.04
  50.99
159.97
               107.24 55.99
105.72 274.95
                                        105.51 109.98
105.72 279.95
                                                                                                                       105.7
                                                                 105.51
                                                                  105.51 1160.8
111.76 1250.79
107.77 1453.76
   433.92
               105.72
110.87
                           435.92
1201.8
                                        105.51 1153.81
111.66 1222.79
                                                                                           107.63 1168.8
112.25 1316.78
   1182.8
                                         111.58 1400.77
103.59 1534.17
 1338.78
               111.91 1357.77
                                                                                            104.64 1494.75
                                                                    102.5 1540.72
                                                                 100.16 1635.79
97.36 1721.02
97.27 1865.26
```

99.56 1645.62 96.85 1734.13

97.08 1881.65

97 1970.16 97.37 2055.39

97 2137.35

97.09

96.98

1589 89

1780.03

1888.21 1980

2075.06

100.23 1599.73

96.85 1907.88 97.15 2002.94

97.1 2091.45

1829.2

96.84

99.84 1612.84

97.91 1704.63 96.95 1842.31

97.19 1937.38 96.88 2039

96.86 2101.29

96.81 1940.66 97.37 2048.84

97.16 2117.68

```
2284.86
                    98.72 2304.53
                                                98.63 2324.2
                                                                             99.04 2340.59
                                                                                                         98.76 2356.98
                                                                                                                                      98.95
                                                 98.89 2393.04
                                                99.34 2458.6
98.97 2540.55
  2442.21
                    98.88 2448.76
                                                                             98.88 2481.54
                                                                                                         98.83 2491.38
                                                                                                                                      99.18
                                                                                                         99.2 2566.77
98.71 2635.61
  2514.32
                    99.21 2533.99
                                                                             99.39 2547.11
  2583.16
                    98.86
                                  2593
                                                  99.9 2606.11
                                                                             99.13 2622.5
                                                                                                                                      99.02
                   98.69 2658.56
98.66 2796.24
                                                98.91 2665.12
98.71 2806.07
                                                                             98.7 2688.06
98.94 2838.85
                                                                                                         98.62 2724.12
98.41 2845.41
  2760.18
                    98.45 2917.53
                                                98.51 2937.2
98.53 2999.48
                                                                             98.36 2943.75
98.77 3025.71
                                                                                                         98.55 2960.14
                                                                                                         98.55 2960.14

98.4 3042.1

98.87 3104.38

98.61 3189.61

98.45 3255.17
  3058.49
                    98.45 3078.15
                                                98.83 3084.71
                                                                             98.61 3097.82
                                                                                                                                      98.57
                   98.55 3133.88
98.65 3212.56
                                                                             98.38 3166.66
98.93 3242.06
                                                 98.85 3150.27
  3206
3271.56
                                                98.91
                                                           3235.5
                   98.91 3281.4
98.7 3350.24
                                                98.87 3294.51
                                                                            98.46 3320.73
98.97 3379.74
                                                                                                         98.73 3330.57
98.54 3386.29
  3337.12
                                                98.41 3369.9
98.53 3474.8
98.58 3560.03
                                                                                                                                      98.69
                   98.4 3455.13
98.3 3546.92
97.74 3641.98
95.27 3700.95
93.96 3789.07
                                                                                                         98.64 3507.58
97.95 3596.09
97.76 3674.77
93.97 3766.22
94.46 3857.61
                                                                            98.27 3501.03
98.16 3579.7
98.04 3655.1
  3438.74
  3625.59
                                                97.81 3645.26
  3684.6
3769.49
                                                94.2 3717.27
93.83 3815.18
                                                                             94.26 3733.58
                                                                             94.31
                                                                                       3831.5
                   94.3 3886.98
96.07 3978.37
                                                94.55 3900.04
95.59 3991.42
                                                                             95.06 3922.88
94.71 4007.74
                                                                                                         95.09 3945.73
92.62 4033.85
  3873.93
  3962.05
                                                                                                                                      89.76
  4053.43
4125.23
                   88.26 4069.75
85.56 4131.76
                                                87.56 4095.86
83.64 4138.29
                                                                             86.86 4105.65
81.1 4144.82
                                                                                                         87.29 4112.18
76.04 4148.08
                                                                                                                                      87.04
75.36
                                                77.74 4161.08
70.28 4211.08
71.38 4301.08
75.57 4337.95
89.33 4390.41
                                                                             76.28 4171.08
71.08 4221.08
                                                                                                         69.98 4181.08
71.08 4231.08
  4148.08
                    79.52 4152.08
                                                                                                                                      69.28
                    69.98 4201.08
71.28 4271.08
                                                                                                        73.28 4321.08
82.13 4354.34
94.58 4406.81
  4251.08
                                                                             72.98 4311.08
                                                                                                                                      72.68
  4328.11
                    75.36 4331.39
85.2 4374.02
                                                                             79.44 4344.51
93.9 4396.97
    4360.9
                   91.73 4429.76
94.21 4482.23
                                                                                                         92.6 4469.11
96.27 4511.74
  4416.65
                                                91.61 4442.88
                                                                             92.46
                                                                                           4456
                                                                                                                                      93 34
  4475.67
                                                94.28 4488.79
                                                                             94.84 4498.63
                                                                                                        96.27 4511.74
98.29 4583.88
96.49 4672.42
95.35 4787.19
94.39 4888.85
93.72 4990.5
93.8 5052.8
93.2 5157.74
                   98.01 4551.09
98.28 4626.51
95.45 4724.89
                                                98.09 4557.65
97.77 4639.63
95.49 4747.84
                                                                            98.28 4574.05
97.22 4649.47
  4528.14
                                                                                                                                      97.86
                                                                             95.18 4764.24
94.59 4875.73
94.12 4977.38
  4711.77
                                                                                                                                      94.94
                   94.81 4819.98
94.36 4938.03
93.57 5016.73
93.24 5098.71
                                                94.89 4836.38
93.97 4951.15
  4898.68
  5010.17
5085.6
                                                                             93.56 5046.25
93.23 5144.62
                                                93.83 5026.57
                                                93.56 5111.83
                                                92.93 5220.04
                                                                                                                                       92.8
  5183.97
                    93.09 5190.53
                                                                             93.02 5233.16
                                                                                                          92.8 5272.51
                                                                            92.48 5367.6
92.36 5426.63
92.65 5508.61
92.42 5580.75
                    92.65 5295.46
                                                92.63 5334.81
92.49 5416.79
92.43 5495.49
93.31 5570.91
92.6 5620.1
92.87 5747.99
                                                                                                         92.53 5443.02
92.53 5518.44
92.35 5587.31
                   92.34 5403.67
92.61 5479.09
92.66 5551.24
  5393.84
                                                                                                                                      92.41
  5469.26
  5534.84
                                                                                                                                      92.63
  5600.42
5702.08
                   92.45 5610.26
92.6 5721.75
                                                                             92.32 5636.49
93.53 5757.82
                                                                                                         92.56 5669.29
93.39 5780.78
                   94.28 5803.73
94.99 5872.59
                                                94.09 5829.96
95.07 5882.43
                                                                            94.13 5836.52
95.95 5888.99
                                                                                                         94.45 5849.64
  5790.61
                                                                                                         96.86 5905.38
                                                                           101.99 5941.46
102.73 5990.64
102.14 6016.88
                                                                                                       102.32 5951.29
104.58 5997.2
101.71 6033.27
                                              102.38 5934.9
102.39 5980.81
  5911.94
                  102.08 5918.5
                                                           5934.9
                                                                                                                                    102.21
                  102.56 5964.41
104.63 6007.04
  6003.76
                                              104.28 6013.6
                                              103.22 6056.23
102.55 6128.37
  6039.83
6108.69
                  102.72 6046.39
102.4 6115.25
                                                                           103.49 6072.62
102.35 6154.6
                                                                                                       102.6 6079.18
102.48 6177.55
                                                                           100.59 6226.74
101.9 6298.88
101.76 6420.21
                  102.33 6216.9
102.81 6246.42
101.8 6367.75
                                              102.04 6223.46
101.78 6275.93
101.69 6380.86
                                                                                                       100.38 6233.3
101.89 6321.84
101.62 6462.84
  6184 11
  6344.79
                                                                                                                                    101.65
                  101.38 6584.17
101.02 6751.41
                                              101.5 6610.4
101.25 6757.97
                                                                           101.29 6633.36
                                                                                                        101.24 6653.03
  6698.94
                                                                           101.08 6780.92
                                                                                                       101.11 6797.32
                 101.02 6751.41
101.04 6820.27
100.83 6951.44
100.86 7079.32
100.53 7223.61
100.78 7331.82
                                              100.25 6757.97
100.8 6849.78
100.84 6964.55
100.81 7092.44
100.73 7266.24
100.86 7338.38
  6803.87
6915.37
                                                                           100.97 6859.62
100.7 7007.18
                                                                                                       100.86 6895.69
100.83 7017.02
                                                                          100.7 7007.18
100.92 7144.91
100.99 7292.47
100.69 7351.49
100.98 7459.71
101.2 7610.55
                                                                                                       100.74 7151.46
101.76 7302.31
  7053 09
   7210.49
  7315.42
                                                                                                       100.94 7374.45
                  101.1 7407.24
101.28 7535.13
                                              100.74 7420.36
101.14 7600.71
                                                                                                       100.95 7466.26
100.82 7620.38
  7518.73
                                              101.14 7600.71
100.95 7669.57
100.85 7774.5
100.77 7866.32
100.66 7958.14
  7640.06
7725.32
                  101.18 7653.18
101.05 7748.27
                                                                           101.12 7685.97
100.86 7787.62
                                                                                                       100.99 7692.53
100.7 7797.46
  7820.41
7931.9
                  100.69 7849.93
100.36 7941.74
                                                                           100.57 7899.11
101.74 7971.25
                                                                                                       100.48 7918.79
101.73 7984.37
102.45 8053.23
                  101.91 8010.6
101.18 8082.75
102.37 8135.21
  7990.93
                                              101.01 8023.72
                                                                           101.68 8046.68
                                                                                                                                    102.36
                                              101.35 8099.14
102.07 8151.61
                                                                           102.23 8105.7
102.39 8158.17
                                                                                                       103.28 8112.26
102.81 8171.28
  8118.82
  8177.84
                                              103.12 8220.47
102.48 8282.78
                                                                           102.46 8230.31
102.56 8289.34
                      103 8194.24
                                                                                                        101.79 8240.15
                  102.93 8269.66
  8256.54
                                                                                                       102.23 8318.85
                                                                                                                                    102.41
                                                                          101.5 8384.44
103 8463.14
111.02 8515.61
104.19 8571.36
                  102.29 8341.81
102.06 8436.91
                                              101.69 8354.92
102.34 8456.58
  8328.69
                                                                                                        101.53 8394.27
  8420.51
                                                                                                        103.88 8476.26
                110.03 8489.37
107.95 8545.12
  8482 82
                                              110.94 8495.93
                                                                                                       110.43 8525.45
                                                                                                                                   110.34
                                             105.18 8558.24
99.03 8781.23
                                                                                                       106.66 8797.63
                     98.1 8771.39
                                                                           102.52 8791.07
                                                                                                                                   107.35
  8761.56
  8827.14 107.86 8843.54 107.66 8850.1
                                                                          107.35 8866.49
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .092 3945.73 .066 4152.08
                                                                         n Val
                                                                                                       n Val Sta
.066 4557.65
                                                                             .015 4331.39
Bank Sta: Left Right Lengths: Left Ct 3945.73 4551.09 1629.91

Ineffective Flow num= 1

Sta L Sta R Elev Permanent 0 3945.73 96.06 T
                                             Lengths: Left Channel
                                                                                        Right
                                                                                                          Coeff Contr.
                                                                                                                                      Expan.
                                                                           1325 767.57
                                              T 20
Left Levee Station= 20
Right Levee Station= 8495.93
                                                                   Elevation= 114.75
                                                                   Elevation=
                                                                                       111.02
| Sta L | Sta R | Elev | Sta L | Sta R | 16.39 | 1203.07 | 111.67 | 4626.51 | 5888.99
 CROSS SECTION OUTPUT Profile #Design Flow
                                                                    Element
                                                                                                                                    Channel
                                                                                                                                                       Right OE
                                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
    Vel Head (ft)
                                                     0.30
                                                                                                                   0.092
                                                                                                                                       0.022
                                                                                                                                                           0.099
    W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                              1629.91
28693.39
                                                                                                                                                      36820.87
                                                                                                                                  14822.11
   E.G. Slope (ft/ft)
Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                              0.000085
                                                                   Area (sq ft)
Flow (cfs)
                                                                                                              29129.25
21375.63
                                                                                                                                 14822.11
80946.81
                                                                                                                                                      36820.87
                                              125000.00
                                                                                                                                                       22677.56
                                                                   Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                7103.24
                                                                                                                2566.93
                                                                                                                                      605.36
                                                                                                                                                        3930.95
                                                                                                                 11.18
    Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                    40 44
                                                                                                                                      24 48
                                                                                                                                                             9 37
                                              13544260.0
                                                                                                                                                       3934.71
                                               1181.84
                                                                                                                2568.15
                                                                                                                                     619.28
           Ch El (ft)
                                                                   Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                     0.06
                                                                                                                                        0.13
                                                                                                                                                            0.05
    Alpha
                                                     8.05
                                                                                                                                         0.70
                                                                                                                                                             0.03
    Frctn Loss (ft)
C & E Loss (ft)
                                                                   Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                                                                       160322.90
                                                                                                              122644.80
                                                                                                                                    49120.56
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 154.81

Description: RGV-04, Updated on left with new survey to Station 1262.78.

Bathymetric elevations translated from IBWC 2008 Cross-sections

| Ctation F | | nymetric | | ons trans
449 | lated in | rom IBWC | 2008 Cr | ss-secti | ons |
|--------------------|--------|--------------------|--------------|--------------------|----------|--------------------|---------|--------------------|------------------|
| Station E
Sta | Elev | Sta | num=
Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 101.13 | 11.99 | 100.62 | 39.99 | 100.63 | 80.98 | 100.42 | 95.98 | 100.14 |
| 100.98 | 98.77 | 104.98 | 98.48 | 123.97 | 98.9 | 140.97 | 94.77 | 148.97 | 95.24 |
| 158.97 | 98.68 | 183.96 | 100.37 | 201.96 | 102.71 | 218.96 | 108.24 | 227.96 | 112.71 |
| 238.95 | 114.16 | 252.95 | 113.86 | 261.95 | 111.09 | 269.95 | 107.16 | 274.95 | 105.51 |
| 805.86 | 105.51 | 811.86 | 111.26 | 816.86 | 113.21 | 826.86 | 113.68 | 835.86 | 113.37 |
| 859.85 | 111.18 | 866.85 | 109.94 | 873.85 | 105.95 | 875.85 | | 1262.78 | 105.51 |
| 4430.18 | | 4436.74 | | 4446.58 | | 4449.86 | | 4476.09 | 113.7 |
| 4482.65
4531.84 | | 4492.49
4541.67 | | 4518.72
4548.23 | | 4525.28
4561.35 | 102.21 | 4528.56
4584.3 | 115.27
100.37 |
| 4531.84 | 100 | 4600.7 | | 4613.82 | | 4636.77 | | 4643.33 | 99.88 |
| 4649.89 | | 4659.72 | | 4669.56 | | 4682.68 | | 4702.35 | 101.62 |
| 4708.91 | | 4725.31 | | 4748.26 | | 4754.82 | | 4764.66 | 101.97 |
| 4774.5 | 101.64 | 4781.05 | 101.88 | 4800.73 | 102.04 | 4810.57 | | 4817.12 | 102.27 |
| 4823.68 | 102.19 | 4833.52 | 102.52 | 4856.48 | 102.94 | 4879.43 | 102.81 | 4899.1 | 103.12 |
| 4908.94 | 103.02 | 4915.5 | | 4925.34 | 103 | 4931.9 | | 4951.57 | 102.41 |
| 4971.25 | | 4981.08 | | 4990.92 | | 5000.76 | | 5007.32 | 102.61 |
| 5013.88 | | 5026.99 | | 5036.83 | | 5049.95 | 101.63 | 5056.5 | 100.95 |
| 5066.34
5138.48 | | 5076.18
5141.76 | | 5099.13
5148.32 | | 5105.69
5158.16 | | 5125.37
5164.72 | 102.28
111.79 |
| 5171.28 | | 5181.11 | | 5184.39 | | 5194.23 | | 5200.79 | 105.29 |
| 5210.63 | | 5217.18 | | 5227.02 | | 5236.86 | 95.52 | 5246.7 | 93.33 |
| 5256.53 | | 5263.09 | | 5276.21 | | 5282.77 | | 5299.16 | 88.6 |
| 5305.72 | | 5315.56 | | 5322.12 | | 5328.68 | | 5341.79 | 96.06 |
| 5348.33 | 96.65 | 5354.85 | 96.27 | 5361.37 | 96.29 | 5374.41 | 94 | 5380.94 | 92.67 |
| 5387.46 | | 5397.24 | | 5410.28 | | 5426.58 | | 5439.62 | 92.96 |
| 5449.4 | | 5455.92 | | 5475.48 | 89.7 | 5482 | 89.07 | 5498.3 | 88.98 |
| 5508.08 | | 5521.13 | | 5530.91 | | 5543.95 | | 5556.99 | 99.81 |
| 5563.51
5592.85 | | 5573.29
5599.37 | | 5579.81
5609.15 | | 5583.07
5615.67 | | 5589.59
5631.97 | 95.29
101.59 |
| 5638.5 | | 5645.02 | | 5651.54 | | 5664.58 | | 5674.36 | 93.21 |
| 5697.18 | 92.53 | 5703.7 | | 5710.22 | | 5716.74 | | 5723.26 | 86.32 |
| 5729.78 | 86.03 | 5736.3 | | 5749.34 | | 5755.87 | | 5762.41 | 79.07 |
| 5768.94 | | 5772.21 | 75.51 | 5778.74 | | 5821.74 | | 5826.74 | 69.05 |
| 5838.74 | 69.15 | 5866.74 | 68.55 | 5880.74 | 68.65 | 5892.74 | 67.49 | 5893.74 | 67.35 |
| 5920.74 | | 5933.74 | | 5946.74 | | 5948.63 | 75.27 | 5951.9 | 75.58 |
| 5955.16 | 76.98 | 5961.7 | | 5974.77 | | 5984.57 | | 5987.83 | 92.4 |
| 6004.17 | | 6020.51 | | 6027.04 | | 6040.11 | | 6046.64 | 96.69 |
| 6059.71
6121.79 | | 6069.51 | | 6089.11 | | 6095.65
6160.99 | | 6108.72 | 95.45 |
| 6183.86 | | 6131.59
6190.39 | | 6138.12
6203.46 | 94.96 | 6219.8 | | 6167.52
6236.13 | 93.48
92.86 |
| 6255.74 | | 6262.27 | | 6281.87 | | 6304.74 | | 6337.41 | 92.21 |
| 6360.37 | | 6373.49 | | 6389.88 | | 6396.44 | | 6406.28 | 92.15 |
| 6432.51 | | 6448.91 | | 6478.42 | | 6488.26 | | 6494.82 | 92 |
| 6511.22 | 92.02 | 6517.78 | 91.86 | 6550.57 | 92.08 | 6573.53 | 92.41 | 6586.64 | 93.32 |
| 6596.48 | | 6606.32 | | 6619.44 | | 6645.67 | | 6655.51 | 92.72 |
| 6671.91 | | 6691.58 | | 6714.54 | | 6727.66 | | 6750.61 | 92.65 |
| 6757.17 | | 6767.01 | | 6780.13 | | 6796.52 | | 6812.92 | 92.53 |
| 6819.48 | | 6845.71 | | 6858.83 | | 6868.67 | | 6878.51 | 96.02 |
| 6888.35
6953.93 | | 6898.18
6967.05 | | 6917.86
6973.61 | | 6937.54
6976.89 | | 6947.37
6986.73 | 95.55
100.93 |
| 7009.68 | | 7019.52 | | 7032.64 | | 7052.31 | | 7058.87 | 100.93 |
| 7071.99 | | 7081.83 | | 7091.67 | | 7098.23 | | 7104.78 | 103.55 |
| 7111.34 | | 7124.46 | | 7144.14 | 102.46 | 7150.7 | | 7163.81 | 102.33 |
| 7180.21 | 102.39 | 7193.33 | 102.23 | 7199.89 | 102.67 | 7209.72 | 102.43 | 7235.96 | 102.47 |
| 7255.64 | | 7262.19 | | 7268.75 | | 7272.03 | | 7278.59 | 103.67 |
| 7288.43 | | 7291.71 | | 7311.38 | 101.86 | 7324.5 | | 7331.06 | 101.94 |
| 7347.46 | 101.91 | 7357.3 | | 7363.85 | | 7393.37 | | 7429.44 | 101.75 |
| 7475.35
7603.25 | | 7488.47 | 101.52 | 7547.5 | | 7570.45 | | 7586.85 | 101.4 |
| 7727.86 | | 7649.16
7770.49 | | 7662.27
7773.77 | | 7698.35
7809.84 | | 7704.91
7842.64 | 101.03
100.79 |
| 7852.48 | | 7875.43 | | 7885.27 | | 7898.39 | | 7908.23 | 100.83 |
| 7944.3 | | 7950.86 | | 7970.53 | | 8000.05 | 100.87 | 8023 | 100.94 |
| 8065.63 | 100.81 | 8104.99 | | 8111.55 | 101.09 | 8118.1 | 100.84 | 8134.5 | 100.76 |
| 8150.9 | 100.83 | 8164.02 | 100.73 | 8193.53 | 100.88 | 8200.09 | 100.73 | 8226.32 | 100.66 |
| 8259.12 | | 8298.47 | | 8311.58 | 101.58 | 8324.7 | | 8347.66 | 101.32 |
| 8367.33 | | 8377.17 | | 8390.29 | | 8400.13 | | 8409.96 | 101.02 |
| 8419.8 | | 8439.48 | | 8452.59 | | 8459.15 | | 8472.27 | 101.23
101.07 |
| 8478.83
8521.46 | | 8491.95
8534.58 | | 8501.78
8564.09 | | 8508.34
8577.21 | | 8514.9
8583.77 | 100.63 |
| 8596.88 | | 8619.84 | 100.71 | 8626.4 | | 8649.35 | | 8662.47 | 100.88 |
| 8672.31 | | 8682.15 | | 8691.98 | | 8714.94 | | 8724.78 | 100.79 |
| 8741.17 | | 8747.73 | | 8760.85 | | 8773.97 | 100.57 | 8800.2 | 100.53 |
| 8806.76 | 100.79 | 8816.6 | 100.73 | 8826.43 | 100.41 | 8846.11 | 100.76 | 8865.79 | 100.9 |
| 8875.62 | | 8888.74 | | 8914.98 | | 8928.09 | | 8931.37 | 100.83 |
| 8947.77 | | 8967.44 | 100.95 | 8974 | | 8987.12 | | 9010.08 | 100.57 |
| 9036.31 | | 9042.87 | | 9059.26 | | 9075.66 | 101.27 | 9085.5 | 101.84 |
| 9098.62 | | 9115.01
9170.76 | | 9121.57
9177.32 | | 9141.25
9183.88 | | 9154.36 | 100.81 |
| 9164.2
9200.27 | | 9170.76 | | 9177.32 | | 9183.88 | | 9190.44
9252.74 | 102.79
101.96 |
| 9262.58 | | 9272.42 | | | | 9298.65 | | 9315.05 | 102.01 |
| 9321.61 | | 9328.17 | | 9334.73 | | 9344.56 | | 9364.24 | 101.49 |
| 9374.08 | | 9400.31 | | 9410.15 | | 9426.55 | 101.05 | 9442.94 | 101.67 |
| 9456.06 | 102.69 | 9465.9 | 102.41 | 9485.57 | 102.84 | 9501.97 | 102.81 | 9518.37 | 103.26 |
| 9528.2 | | 9531.48 | | 9538.04 | 106.38 | 9544.6 | | 9554.44 | 111.18 |
| 9561 | | 9570.83 | | 9583.95 | | 9603.63 | | 9616.75 | 109.88 |
| 9620.02 | | 9626.58 | | 9633.14 | | 9642.98 | | 9646.26 | 103.9 |
| 9656.1
9865.97 | | 9659.38
9872.53 | | 9669.21
9879.09 | | 9856.13
9882.37 | | 9862.69
9898.76 | 98.32
107.8 |
| 9928.28 | 108.16 | | | | | 9977.47 | | 9993.86 | 107.8 |
| 9997.14 | | 10003.7 | | 10006.98 | | 10010.26 | 95.59 | | 101.02 |
| | | | | | | | | | |
| Manning's | | | num= | 7 | | | | | |
| Sta | n Val | | | | n Val | | | Sta | n Val |
| 0 | | | | | | | | | |
| 6059.71 | | 4518.72
8947.77 | .06 | 5631.97 | .07 | 5768.94 | .025 | 5955.16 | .07 |

```
Bank Sta: Left Right 5631.97 6059.71
                                         Lengths: Left Channel
                                                                                 Right
                                                                                                Coeff Contr. Expan.
                                          1120.03 1324.83 1829.96
0 5631.97 101.59 T
6059.7110010.26 98.44 T
Left Levee Station= 9570.83
Right Levee Station= 9570.83
Blocked Obstructions num=
Sta L Sta R Elev
826.86 4476.09 113.7
                                                         Elevation= 114.16
Elevation= 111.36
CROSS SECTION OUTPUT Profile #Design Flow
                                                            Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                        109.80
                                                                                                                     Channel
                                  0.19 Wt. n-..
109.62 Reach Len. (ft)
94.22 Flow Area (sq ft)
0.000352 Area (sq ft)
125000.00 Flow (cfs)
5520.31 Top Width (ft)
Avg. Vel. (ft/s)
   E.G. Elev (ft)
                                                                                                      Left OB
                                                                                                                                         Right OB
                                                                                            112c
10162.52
13638.78
9396.6
   Vel Head (ft)
                                                                                                         0.106
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                         1829.96
                                                                                                                       1324.83
   Crit W.S. (ft) 94.22
E.G. Slope (ft/ft) 0.000352
Q Total (cfs) 125000.00
Top Width (ft) 5520.31
Vel Total (ft/s)
                                                                                                                      12008.58
                                                                                                                      12008.58
                                                                                                                                        36114.08
                                                                                                       9396.60
                                                                                                                       57242.79
                                                                                                                                          58360.61
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                                                         427.74
                                                                                                                                          3485.73
                                                            Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                          0.92
                                                                                                                                              1.86
                                                                                                                            4.77
   Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                             Conv. (cfs)
Wetted Per. (ft)
                                          6664564.0
                                                                                                      500994.0
                                                                                                                       3051986.0
                                                                                                                                           3111584.0
                                                             Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                                                         0.60
                                                                                                       0.14
                                             66.95
                                                                                                                                              0.20
                                                2.22
                                                                                                           0.13
                                                                                                                            2.84
   Frctn Loss (ft)
                                                                                                    121844.70
                                                                                                                        48712.50
                                                                                                                                          159680.30
   C & E Loss (ft)
                                               0.02
                                                             Cum SA (acres)
                                                                                                    17446.45
                                                                                                                        2190.69
                                                                                                                                        20179 11
```

Warning: Divided flow computed for this cross-section.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 154.6 REACH: Lower Reach

Description: RGV-04, Updated on left with new survey to Station 1108.94.

Bathymetric elevations translated from IBWC 2008 Cross-sections

Station Elevation Data num= 469 Sta 1.67 13.84 97.92 35.59 102.1 69.22 112.04 96.05 113.66 12° 105.66 Sta 5.93 30.65 59.33 Sta Elev 10.87 96.93 95.74 95.3 97.78 94.45 98.11 19.77 44.49 95.26 98.42 0 102.35 58.34 100.02 100.18 68.23 78.12 104.9 106.63 113.79 84.05 109.05 107.03 113.82 94.05 113.05 112.81 100.05 113.31 113.53 123.05 112.9 83.06 105.05 110.77 137.04 113.53 1123.65 107.5 142.04 113.37 1136.77 107.44 1189.24 129 04 105 51 1108 94 112.85 1166.28 106.98 1195.8 106.73 1205.64 1179.4 109.16 1185.96 106.46 4950.84 110.18 4980.36 106.8 4960.68 112.24 5000.04 108.92 4963.96 113.02 5009.88 1215.47 106.46 4954.12 111.14 4990.2 114.77 5039.38 103.49 5075.43 100.73 5134.41 97.45 5170.46 100.29 5229.45 4973.8 114.93 5055.77 101.37 5091.81 98.93 5147.52 100.96 5190.12 5023 114.18 5029.55 107.3 5072.15 115.24 5042.66 102.67 5085.26 5062.32 100.9 100.41 5124.58 97.12 5167.18 99.45 5140.97 98.13 5180.29 5104.92 5199.95 100.98 5216.34 100.4 5249.11 100.2 5258.94 99.63 99.72 5281.88 101.32 5344.14 99.16 5298.26 100.74 5367.08 99.47 5321.2 100.66 5373.63 101.33 5327.75 99.89 5383.46 5337.59 95.98 5426.06 94.02 5471.94 99.7 5514.54 114.02 5566.97 94.83 5432.62 94.22 5478.5 101.15 5521.1 96.33 5403.12 94.76 5452.28 95.68 5412.96 94.6 5462.11 5393.29 5442.45 96.2 5494.88 108.68 5553.87 97.78 5501.43 113.22 5560.42 5488.33 5537.48 113.13 5573.53 103.7 5599.74 101.28 5684.95 97.71 5740.65 5580.08 108.71 5593.19 102.17 5609.57 101.94 5619.41 101.2 5698.05 98.4 5747.21 100.05 5704.61 99.38 5757.04 99.54 5678.39 97.96 5730.82 5717.72 99.19 5783.25 97.88 5812.75 99.31 5786.53 97.79 5825.86 99.16 5793.09 96.61 5842.24 5770.15 98.05 5799.64 96.05 5855.35 5806.19 96.33 95.04 5904.5 95.94 5950.38 97.36 6071.63 100.18 6117.51 97.95 6166.66 96.19 5875.01 97.52 5927.44 95.33 5894.67 95.92 5940.55 5861.9 95.34 5888.12 5917.61 96.89 5934 96.89 5934 96.17 6022.48 5973 32 96 51 5999 54 96.2 6051.97 97 55 97.82 6088.02 100.28 6133.89 96.39 6183.05 97.08 6222.37 98.87 6094.57 99.86 6143.72 99.4 6110.95 99.07 6153.55 6124.06 96.53 6192.88 97.12 6228.92 97.92 6199.43 96.62 6238.76 98.43 6205.99 94.12 6242.03 6179.77 6215.82 93.66 92.95 6258.42 90.31 6304.29 92.95 6271.53 90.21 6317.4 91.78 6360 93.59 6278.08 90.46 6327.23 93.08 6287.91 90.34 6340.34 6251.86 6294.46 88.73 6392.77 86.96 6432.1 88.34 6474.7 6343 62 91.77 6346.9 89.64 6369.83 86.11 6415.71 87.69 6458.31 86.22 6425.54 6438.65 87.99 6448.48 88.29 6464.87 87.91 88.59 6494.36 76.57 6530.41 88.35 6497.64 75.26 6533.68 87.58 6507.47 75.1 6538.68 84.51 6520.57 68.77 6541.68 6527.13 67.1 6551.68 64.26 6561.68 62.46 6621.68 63.56 6571.68 61.76 6631.68 63.46 6591.68 61.46 6651.68 62.66 6601.68 60.46 6671.68 6611.68 75.16 6691 83.41 6717.23 91.27 6759.86 104.17 6782.82 105.2 6838.57 76.46 6694.28 85.71 6727.07 92.95 6766.42 104.25 6795.94 104.04 6851.69 77.65 6700.83 87.26 6733.63 97.94 6769.7 103.71 6805.77 6681.16 6707.39 75.1 6684.44 81.83 6710.67 79 28 90.22 6753.3 103.23 6779.54 102.91 6828.73 6743.47 6769.7 100.13 6776.26 6815.61 102.76 6864.8 102.07 6877.92 102.56 6884.48 102.96 6930.39 101.87 6891.04 102.3 6940.23 101.52 6897.6 102.2 6946.79 101.71 6907.44 102.48 6956.63 101.45 6979.58 102.38 7025.49 101.26 6989.42 101.68 7005.82 99.85 7035.33 101.53 7015.66 101.07 7038.61 6966.47 102.95 100.8 7028.77 103.17 7055.01 7022.21 7045.17 102.63 7051.73 103.81 7068.13 103.55 7081.24 103.8 102.55 7104.2 101.97 7173.07 102.56 7114.04 101.78 7189.46 102 7136.99 102.08 7209.14 101.89 7215.7 102.04 7281.29 102.91 7333.76 7163.23 7225.54 7291.12 101.68 7255.05 102.35 7297.68 101.82 7261.61 102.75 7314.08 102.35 7268.17 103.11 7320.64 101.91 7363.27 101.83 7425.58 102.47 7510.85 101.79 7553.48 108.61 7576.43 101.82 7376.39 101.9 7458.37 102.36 7392.79 101.74 7481.33 7343.6 102.25 7353.43 102.18 7520.68 102.14 7527.24 101.91 102.18 7520.68 102.14 7527.24 101.91 102.41 7560.04 106.7 7563.32 108.12 107.04 7586.27 99.38 7589.55 97.87 99.2 7615.79 101.21 7622.35 101.3 7497 73 102 04 7507 57 102.16 7546.92 108.78 7573.15 7566.6 97.68 7599.39 101.93 7651.86 99.03 7602.67 102.28 7658.42 99.2 7615.79 102.51 7671.54 7632.18 102.65 7714.17 102.24 7724.01 101.26 7779.76 102.32 7796.15 102.3 7737.12 101.35 7746.96 101.2 102.1 7802.71 101.87 7812.55 102.08 7701.05

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101.83 7828.95
                                                                                              100.44 7950.29
100.1 8019.15
  7871.58
                100.34 7904.37
                                          100.42 7914.21
                                                                     100.62 7920.77
100.25 8012.59
                                                                                                                         100.36
                                                                                               101.72 8058.51
  8028.99
                101.81 8035.55
                                          101.74 8042.11
                                                                     101.23 8048.67
                                                                     106.36 8094.58
106.16 8147.05
  8068.34
                105.15 8078.18
                                           106.09 8088.02
                                                                                               106.11 8101.14
  8114.26
                  106.4 8120.81
                                          106.22 8133.93
                                                                                               106.34 8156.89
                105.53 8179.84
106.29 8278.23
                                          105.71 8192.96
106.03 8284.79
                                                                     105.65
105.75
                                                                                 8219.2
8297.9
                                                                                              105.87 8242.15
105.93 8307.74
  8261.83
                                                                    106.75 8297.9
106.06 8370.05
107.54 8412.68
105.75 8461.87
102.4 8530.74
105.84 8566.81
                                          105.58 8360.21
105.12 8409.4
108.22 8452.03
   8330.7
                105.77 8340.53
                                                                                              104.5 8383.17
108.44 8415.96
   8442.2
                108.52 8445.48
                                                                                                104.3 8468.43
                                                                                                                          102.8
                                          108.22 8452.03
102.5 8511.06
103.09 8563.53
103.17 8625.84
101.9 8720.95
                102.29 8504.51
103.03 8553.7
                                                                                              102.55 8537.3
105.91 8573.37
  8547.14
                105.54 8622.56
                                                                    102.87 8648.8
101.45 8730.78
                                                                                              102.54 8661.92
100.99 8747.18
  8616.01
                101.85 8691.43
  8684.87
                                          101.9 8720.95
102.35 8783.25
101.91 8858.68
101.36 8901.31
102.22 8963.62
101.87 9042.33
102.65 9114.48
102.43 9170.22
  8770.14
                101.07 8779.98
101.88 8842.28
                                                                    102.55 8796.37
101.41 8865.24
                                                                                               102.69 8806.21
                                                                                              102.69 8806.21
101 8881.64
100.54 8927.55
101.73 8980.02
101.77 9065.28
  8816.05
   8888.2
8950.5
                102.06 8894.75
101.32 8957.06
                                                                    101.4 8917.71
102.35 8970.18
                                                                                                                         100.97
  8986.58
                100.96 9016.09
                                                                     101.66 9058.73
                                                                                              102.85 9140.71
102 9189.9
102.88 9294.84
109.8 9327.63
                102.34 9101.36
102.88 9160.39
                                                                    102.49 9127.59
102.36 9180.06
  9150.55
                                                                                                                           102.3
                                          102.15 9278.44
110.19 9314.51
  9206.3
9304.67
                102.06 9219.41
108.86 9311.23
                                                                     102.77 9291.56
109.32 9321.07
 9340.75 110.86 9357.14
9389.94 105.14 9399.77
9416.17 98.23 9419.45
9639.16 103.95 9642.44
9688.34 107.15 9694.9
                                         110.19 9314.51
110.08 9376.82
105.06 9403.05
98.1 9616.2
105.23 9652.27
107.55 9701.46
                                                                                              108.32 9386.66
101.97 9412.89
98.55 9629.32
                                                                     109.42 9380.1
                                                                                                                         105.39
                                                                    98.1 9626.04
106.47 9662.11
107.12 9717.86
                                                                                              106.76 9671.95
Manning's n Values
                                          num=
                                         n Val Sta
.168 5566.97
       Sta n Val Sta
0 .168 5560.42
69.7 .067
                                                            Sta
                                                                     n Val
                                 Sta
                                                                                                  n Val Sta
.015 6710.67
                                                                       .066 6520.57

        Bank Sta: Left 6133.89 6779.54
        Lengths: Left Channel 1291.37 1665

        Ineffective Flow Sta L Sta R Elev Permanent
        num 2

                                                                                                  Coeff Contr.
                                                                                 Right
                                                                                                                          Expan.
                                                                      1665 1771.03
  6779.54 9717.86 104.17
Left Levee Station= 109.05
Right Levee Station= 9340.61
                                                           Elevation= 113.82
Right Levee Scale
Blocked Obstructions
Sta R Elev
                                                             Elevation= 110.86
                                       num=
 Sta L Sta R Elev
1136.77 5000 112.85
CROSS SECTION OUTPUT Profile #Design Flow
                                         109.10
   E.G. Elev (ft)
                                                                                                        Left OB
                                                                                                                                           Right OB
                                                             Element
                                                                                                                         Channel
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                              Wt. n-Val.
Reach Len. (ft)
                                                                                                       0.097
1291.37
                                                                                                                         0.053
1665.00
                                                 0.41
                                             108.69
                                                             Flow Area (sq ft)
Area (sq ft)
                                               92 52
                                                                                                     11596 60
                                                                                                                       15902 11
                                                                                                                                          10465 50
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                       16075.17
                                                                                                                         93639.61
                                          125000.00
                                                               Flow (cfs)
                                                                                                                                           15285.21
                                                             Top Width (ft)
                                                             Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                        1.39
                                                                                                                                             1.46
                                                3.29
                                                                                                                            5.89
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                               49 63
                                                                                                                            24 63
                                          4894085.0
                                                                                                       629386.1
                                                                                                                         3666242.0
                                                                                                                                             598456.9
                                            1636.83
                                                                                                       2019.36
                                                                                                                           668.58
                                                                                                                                           2533 24
   Min Ch El (ft)
                                                                                                       0.23
                                                                                                                          0.97
   Alpha
                                                2.44
                                                                                                            0.32
                                                                                                                              5.70
                                                                                                                                                0.25
                                                             Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                     121498.60
                                                                                                                         48288.06
                                                                                                                                         20052.94
   C & E Loss (ft)
                                                                                                     17399.94
                                                                                                                         2174.37
                                                0.00
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
              Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                          RS: 154.23
Description: RGV-04, Updated on left with new survey to Station 1126.98.
                    Bathymetric elevations translated from IBWC 2008 Cross-sections
              Elevation Data num=
Elev Sta Elev
97.77 6.93 98.1
94.44 29.68 94.7
99.69 72.22 100.96
111.31 103.05 112.96
113.93 129 05
                                                      473
Station Elevation Data
       Sta
0
                                             Elev
                                                            Sta
                                                                        Elev
                                                                                                  Elev
                                                                    97.29 13.85
95.6 45.51
101.99 89.05
113.32 108.05
                                           98.14
94.78
                                                        10.88
35.62
                                                                                                96.35
98.16
     24.73
                                                                                                             56.39
91.05
                                                                                                                           99.24
                                          100.98 76.18
112.98 104.05
                                                                                              105.75 91.05
113.86 113.05
   100.05
   128.05
                            129.05
151.04
                                          113.8 138.04
105.51 1012.99
                                                                     110.49 145.04
105.51 1013.99
                                                                                               107.03 147.04
                                                                                               105.52 1126.98
                106.46 1317.95
113.95 1376.99
                                          106.74 1321.23
112.78 1393.39
                                                                    108.35 1334.35
111.9 1403.22
                                                                                              113.09 1337.63
111.11 1409.78
  1314.67
                                                                                                                         113 74
  1344.19
                                                                     106.46 2173.96
   1439.3
                108.26 1449.14
                                          106.59
                                                      1455.7
                                                                                               106.46 2177.24
                                            113 2196.92
115 2252.68
                111.71 2187.08
114.88 2242.84
                                                                     114.38 2203.48
114.68 2262.52
                                                                                              114.77 2216.6
112.88 2265.8
   2183.8
  2226.44
  2272.36
                107.69 2275.64
110.12 5013.27
                                          106.52 2278.92
111.46 5029.37
                                                                    106.46 4987.52
113.09 5045.47
                                                                                              106.46 4993.96
114.51 5055.13
  5003.61
                114.73 5068.01
101.65 5094.04
                                          114.54 5071.23
100.47 5097.31
  5064.79
                                                                      113.3 5077.67
                                                                                               108.31 5084.21
  5090.76
                                                                      99.95 5107.13
                                                                                                  99.4 5113.68
   5123.5
                   98.9 5143.15
                                            95.97
                                                       5149.7
                                                                      94.83 5159.52
                                                                                                94.31 5169.34
                                                                                                                           94.61
                                          97.2 5185.71
100.46 5247.92
94.17 5293.76
93.15 5346.15
                  94.96 5179.17
99.57 5241.38
                                                                   98.47 5192.26
100.31 5257.75
                                                                                                 99.58 5267.57
                                                                                                                             98.2
      5225
  5277.39
                  96.43 5287.21
92.9 5336.33
                                                                      93.91 5303.59
94.15 5349.42
                                                                                                93.89 5313.41
95.19 5355.97
  5326.51
```

111.68 5395.26 102.53 5441.1

100.71 5490.22

98.04 5588.44

99.76 5637.56 97.14 5686.67

97.45 5742.33 99.12 5781.62 112.67

100 31

97.71

99.7

109 5391.99

106.54 5424.73

100.28 5480.39 99.57 5522.96

99.14 5578.62

99.24 5631.01 97.24 5673.57

96.67 5729.23

5362.52

5447 65

5555.7

5601.54

5644.1

5699.77

101 5369.07

112.99 5405.09

100.29 5454.2

99.78 5565.52

97.64 5617.91 99.06 5650.65

97.01 5703.04 97.53 5752.15 103.18 5385.44

99 79 5473 84

99.5 5513.14 99.66 5572.07

98.25 5624.46 98.97 5667.02

96.71 5716.14 97.64 5765.25

```
95.61 5820.91
94.77 5879.85
                                                                                                      94.72 5830.73
94.07 5886.4
97.12 5945.33
  5843.83
                   94.39 5853.65
                                              95.29 5873.3
                                                                                                                                  93.94
98.48
                                             100.37
                                                                        100.57 5981.35
97.23 6043.56
  5955.15
                   98.84 5964.98
                                                          5974.8
                                                                                                    100.91
                                                                                                                  5987.9
                                                                                                                                100.87
                                              99.27 6033.73
                                                                                                      96.06 6053.38
  5994.44
                   100.5 6010.82
   6063.2
                   95.65 6073.03
                                               95.22 6082.85
                                                                            96.5
                                                                                     6089.4
                                                                                                      96.92 6099.22
                                                                                                                                  96.56
  6105.77
6154.88
                   95.54 6112.32
91.69 6161.43
                                              93.95 6125.41
91.61 6167.98
                                                                          91.5 6135.24
92.39 6174.53
                                                                                                      91.36 6145.06
93.58 6181.07
                                                                                                     87.32 6220.36
88.7 6279.3
83.54 6312.04
73.63 6344.78
49.43 6438.23
  6184.35
                   93.82 6197.45
                                                89.8 6203.99
87.2 6253.11
                                                                          87.97 6210.54
                                                                                                                                  87.32
                                                                          84.15 6305.49
77.39 6338.24
50.53 6426.23
  6285.85
                   88.07 6295.67
                                              86.31 6302.22
                                                                                                                                  83.22
                                              80.8 6328.41
50.72 6413.23
49.13 6471.23
73.13 6567.46
                   82.73 6321.87
68.69 6385.23
  6358.23
                                                                                                     48.83 6493.73
77.11 6590.42
                   49.23 6460.73
51.33 6560.91
                                                                          49.23 6482.23
73.44 6583.86
  6449 23
                                                                                                                                  48 83
  6504.23
                                                                                                                                  78.42
                                            82.2 6606.81
93.61 6629.76
99.64 6692.06
100.36 6787.16
101.62 6823.23
                                                                                                    82.9 6613.37
99.38 6636.32
99.7 6757.64
101.04 6793.71
   6593.7
                   79.47 6600.25
91.14 6623.21
                                                                          83.21 6610.09
97.69 6633.04
  6619.93
                 99.49 6678.95
100.42 6777.32
101.72 6813.39
                                                                        99.6 6715.02
102.12 6790.44
101.18 6833.06
  6659.28
                                                                                                                                  99.67
  6800.27
                                                                        101.18 6833.06
101.5 6892.09
101.3 7000.3
101.31 7101.95
101.27 7239.68
101.33 7321.66
100.96 7426.59
101 7531.52
99.59 7580.71
100.47 7629.9
106.45 7672.53
                                                                                                    101.11 6839.62
                                                                                                                                101.37
                 101.25 6852.74
101.38 6960.95
                                            101.47 6885.53
101.47 6970.79
                                                                                                    101.4 6908.48 101.56
101.44 7023.25 101.46
  6846.18
  6918.32
                                            101.47 6970.79
101.43 7085.56
101.32 7213.45
101.44 7318.38
101.13 7416.75
100.81 7521.69
                                                                                                   101.44 7023.25 101.46
101.41 7124.91 101.4
101.34 7249.52 101.24
101.5 7331.5 101.27
101.07 7439.71 100.85
100.87 7538.08 101.39
99.43 7593.83 99.61
101.31 7636.46 103.13
                 101.29 7049.49
101.27 7203.61
  7039.65
  7131.47
                 101.39 7308.54
101.33 7377.4
100.94 7462.66
  7262.63
  7459.38
   7551.2
                 100.53 7561.04
99.42 7616.78
                                            100.12 7567.59
100.7 7623.34
  7603.66
                                                                        106.45 7672.53
103.46 8052.91
                                            106.43 7669.25
103.15 8046.35
  7643 01
                 105.81 7646.29
                                                                                                    105.96 7682.36
                 103.15 8033.23
  7685.64
                                                                                                    104.54 8059.47
                                                                                                                                  105.2
  8062.75
8085.7
                 106.48 8066.02
103.39 8098.82
                                            106.73 8069.3
102.78 8377.55
                                                                        105.87 8075.86
                                                                                                    105.58 8082.42
                                                                                                     102.86 8420.18
                                                                        105.15 8446.42
103.56 8485.77
101.17 8531.68
                                                                                                    105.86 8456.25
102.39 8495.61
100.38 8544.8
  8426.74
                 105.88 8433.3
                                             106.03 8439.86
                 106.01 8475.93
101.32 8515.28
                                            103.83 8479.21
101.46 8521.84
100.76 8587.43
102.6 8646.45
  8505.44
                 100.5 8574.31
102.25 8639.9
                                                                                                    101.35 8613.66
102.39 8662.85
  8548 08
                                                                        101.43 8603.82
                                                                         102.22 8656.29
  8630.06
                 102.74 8692.36
  8669.41
                                             102.72 8698.92
                                                                        102.92 8705.48
                                                                                                    102.24 8725.16
                                             101.94 8754.67
                                                                         102.16 8761.23
                 102.62 8794.02
105.74 8843.21
103.16 8905.52
                                             103.2 8803.86
106.5 8862.89
103.04 8925.19
                                                                        103.31 8810.42
105.47 8872.73
103.26 8935.03
  8780.91
                                                                                                    104.08 8823.54
                                                                                                                                104.98
                                                                                                    103.86 8889.12
103.62 8941.59
  8830.09
  8902.24
                103.16 8903.32
104.08 8964.55
104.62 9013.74
104.79 9072.76
104.91 9118.67
                                            103.04 8923.19
104.65 8974.38
104.97 9030.13
105.08 9085.88
104.53 9128.51
                                                                                                    104.75 8994.06
105.13 9056.37
  8961 27
                                                                        104.83
                                                                                      8987.5
                                                                        104.86 9036.69
  9000.62
                                                                                                    104.86 9102.28
105.76 9144.91
                                                                       104.76 9095.72
105 9135.07
   9066.2
                                                                                                                                105.52
                                            105.93 9187.54
106.59 9236.73
106.87 9331.83
107.1 9436.76
106.18 9495.79
99.07 9541.7
                 106.1 9167.86
106.45 9213.77
106.98 9292.48
                                                                       106.77 9194.1
106.57 9249.84
107.17 9354.78
                                                                        106.77
   9161.3
                                                                                                    106.54 9200.66
                                                                                                    107.18 9364.62
  9269.52
                                                                                                                                  107.3
                                                                        107.17 9354.78 107.18 9364.62 107.1 9443.32 106.84 9449.88 104.28 9505.63 100.49 9512.19 105.33 9548.26 106.57 9554.82 106.24 9607.29 105.24 9620.41 100.21 9656.48 100.88 9659.76
                 106.96 9403.97
106.61 9489.23
   9384.3
  9485.95
  9518 75
                   98 52 9522 03
                   106.6 9584.33
99.79 9633.52
                                            106.69 9600.73
100.3 9646.64
  9623.68
                                                                                                                                100.65
                                            99.48 9702.39
101.18 9741.74
                                                                        100.13 9712.23
101.32 9751.58
                                                                                                    99.9 9715.5
100.55 9758.14
  9725.34
                 100.29 9731.9
                                                                                                                                100.44
                                            101.16 9741.74
101.65 9830.28
100.61 9908.98
100.76 9971.29
99.7310027.04
                 101.4 9823.72
101.42 9895.87
100.62 9948.33
                                                                        101.84 9863.07
100.17 9928.66
100.77 9987.69
                                                                                                   101.94 9876.19
100.57 9935.22
99.92 9994.25
  9794 21
  9889.31
  9941 78
                                                                         100.0510036.88
                                                                                                    101.4110049.99
                 100.3110010.64
                                             102.0810076.23
10056.55
                 101.9210066.39
                                                                        103.0410089.34
                                                                                                    105.5510099.18
                                                                                                                                108.52
                                            109.91 10128.7
103.8810184.44
                                                                        109.2810151.65
102.9810194.28
                 110.3810122.14
                                                                                                   108.8310161.49
10168.05 104.2910181.17
                                                                                                      98.4310197.56
                                                                                                                                   98.1
10374.64 98.1110387.76 98.9510391.04
10410.72 105.4110423.83 106.6210440.23
                                                                        100.06 10397.6
                                                                                                  104.1110400.88 105.05
                                                                       107.02
Manning's n Values
 Sta n Val Sta
0 .066 5401.81
6659.28 .066 9505.63
                                   Sta n Val
                                                                Sta
                                                                         n Val
                                                                                           Sta
                                                                                                    n Val
                                                                                                                                n Val
                                              .12 5981.35
                                                                           .07 6328.41
                                                                                                     .025 6504.23
                                                                                                       Coeff Contr.
Bank Sta: Left
                                             Lengths: Left Channel
                             Right
                                                                                      Right
                                                                                                                                Expan.
Bank Sta: Lett Right
5981.35 6659.28
Ineffective Flow num=
                                             1440.02 1665.03 1862.69
2
 Sta L Sta R Elev
0 5981.35 100.91
6659.2810440.23 99.49
                                  Elev Permanent
Left Levee Station= 113.05
Right Levee Station= 10112.3
                                                                Elevation= 114.18
Elevation= 110.38
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R Elev
1337.63 5029.37 113.74 6659.28 8843.21 106.5
CROSS SECTION OUTPUT Profile #Design Flow
                                                                 Element
   E.G. Elev (ft)
                                               108.08
                                                                                                             Left OB Channel
                                                                                                                                                  Right OB
   Vel Head (ft)
W.S. Elev (ft)
                                                0.40
107.68
                                                                 Wt. n-Val.
Reach Len. (ft)
                                                                                                                0.088
                                                                                                                                   0.060
                                                                                                                               1665.03
                                                                                                             1440.02
   Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                Flow Area (sq ft)
Area (sq ft)
                                                                                                           8178.79
10817.31
                                                  78 20
                                                                                                                              19300.02
                                                                                                                                                   7449 27
                                            0.000595
                                                                                                                                                   7463.31
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                              9862.23
                                                                                                                               105447.90
                                            125000.00
                                                                   Flow (cfs)
                                                                                                                                                      9689.85
                                                                                                                                 677.93
                                                                 Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                              1.21
                                                                                                                                                      1.30
                                                  3.58
58.85
                                                                                                                                     5.46
                                                                Avg. Vel. (It/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                  3 99
                                                                                                                                   28.47
                                             5124070.0
                                                                                                                                4322580.0
                                              1681.57
                                                                                                             2056.49
                                                                                                                                 707.14
                                                                                                                                                  3442.19
                                                                                                                                 1.01
   Min Ch El (ft)
                                                  48.83
                                                                                                                  0.15
                                                                                                                                                        0.08
   Alpha
                                                   1.99
                                                                                                                  0.18
                                                                                                                                     5.54
                                                                                                                                                        0.10
   Frctn Loss (ft)
                                                                  Cum Volume (acre-ft)
                                                                                                                                                19931.82
   C & E Loss (ft)
                                                                 Cum SA (acres)
                                                                                                           17339.79
                                                                                                                                2149.07
                                                   0.02
```

Warning: Divided flow computed for this cross-section

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

99.24 5804.54

the need for additional cross sections.

Manning's n values were composited to a single value in the main channel

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. RIVER: Rio Grande REACH: Lower Reach

RS: 153.85

 $\begin{tabular}{ll} INPUT \\ Description: RGV-04, Updated on left with new survey to Station 1122.15. \end{tabular}$

| Description | | | | left with | | | | | one |
|----------------------|----------------------|--------------------|------------------|----------------------|------------------|----------------------|-----------------|----------------------|------------------|
| Station E | | | num= | 477 | raceu ii | OIII IBWC | 2000 CI | Jaa-secti | OIIS |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev
94.92 |
| 0
26.75 | 97.9
94.41 | 6.93
28.73 | 97.92
94.41 | 7.92
37.65 | 97.75
96.29 | 18.82
49.54 | 95.27
99.04 | 20.8
50.53 | 99.25 |
| 64.4 | 101.43 | 74.31 | 103.59 | 83.23 | 105.78 | 85.21 | 106.53 | | 112.65 |
| 97.19
122.19 | 112.94
113.91 | 103.19
124.19 | 113.83
113.51 | 104.19
132.19 | 113.91
110.34 | 111.19
137.19 | 114.2
107.73 | 113.19
138.19 | 114.24
107.27 |
| 142.19 | 105.92 | 144.19 | 105.52 | 1053.15 | 105.52 | 1054.15 | 105.51 | 1122.15 | 105.51 |
| 1936.81
1989.28 | 106.46 | | | 1959.76
2008.96 | | 1966.32
2012.24 | | 1976.16
2015.51 | 113.73
106.46 |
| 4806.32 | 106.46 | | | 4822.71 | | 4842.39 | | 4865.35 | 114.62 |
| 4868.63 | 114.87 | | | 4891.58 | | 4894.86 | | 4898.14 | 114.18 |
| 4904.7
4947.33 | 93.82 | | 107.07 | 4921.1
4957.17 | | 4927.65
4960.45 | | 4934.21
4967.01 | 101.32
94.58 |
| 4970.29 | 95.55 | 4976.85 | 96.82 | 4983.41 | 99.01 | 4986.68 | 99.53 | 4996.52 | 100.1 |
| 5012.92 | 100.04 ! | | | 5035.88 | 98.46
101.35 | | | 5052.27
5157.21 | 99.51 |
| 5062.11
5167.05 | 101.84 | | 100.57 | 5127.7
5183.45 | | 5144.1
5196.57 | | 5209.69 | 101.73
101.64 |
| 5216.24 | 101.46 | 5226.08 | 100.38 | 5242.48 | 100.52 | 5252.32 | 100.92 | 5265.44 | 101.19 |
| 5275.27
5350.7 | | | | 5298.23
5360.54 | 100.35
98.32 | 5324.47
5367.1 | | 5337.58
5386.77 | 98.89
97.53 |
| 5393.33 | | 5399.89 | | 5406.45 | | 5413.01 | | 5429.41 | 97.92 |
| 5439.24 | | 5452.36 | 99.76 | 5462.2 | | 5472.04 | | 5485.16 | 98.53 |
| 5501.55
5537.63 | | 5508.11
5544.19 | | 5521.23
5550.75 | | 5527.79
5560.58 | | 5534.35
5567.14 | 83.56
75.65 |
| 5573.7 | 74.28 | 5590.1 | | 5593.38 | 73.03 | 5598.1 | 70.94 | 5599.1 | 68.64 |
| 5629.1 | 66.54 | 5639.1 | 66.84 | 5659.1 | 66.44 | 5669.1 | 66.44 | 5679.1 | 67.04 |
| 5699.1
5759.1 | 67.04
68.44 | 5709.1
5769.1 | 67.44
68.44 | 5719.1
5769.92 | 67.44
73.03 | 5739.1
5776.46 | 68.24
73.79 | 5749.1
5796.07 | 68.94
80.83 |
| 5799.34 | | 5812.41 | | | | 5825.49 | | 5828.75 | 89.24 |
| 5838.56 | | 5851.63 | | | | 5871.24 | | 5877.78 | 89.4 |
| 5884.32
5926.81 | | 5890.86
5943.15 | | 5900.66
5949.69 | 88.81
95.72 | 5907.2
5956.23 | | 5920.27
5962.76 | 92.31
98.42 |
| 5982.37 | | 5992.18 | 97.91 | 6001.99 | | 6015.06 | 98.49 | 6031.4 | 99.06 |
| 6047.74 | 100.02 | | | | | 6080.43 | | 6090.24 | 98.87 |
| 6103.31
6168.68 | 99.58 | 6116.38
6198.1 | | 6122.92
6237.32 | | 6139.26
6243.86 | | 6162.14
6266.73 | 99.9
99.79 |
| 6289.61 | 99.86 | 6319.03 | 99.74 | 6325.57 | 99.58 | 6335.37 | 99.81 | 6348.45 | 99.64 |
| 6354.98 | | 6368.06
6426.95 | | 6381.13
6430.23 | 99.53 | 6384.4
6459.75 | | 6397.48
6469.58 | 99.61
99.25 |
| 6410.55
6476.14 | | 6485.98 | | 6512.22 | | 6522.06 | 99.54 | 6531.9 | 99.37 |
| 6561.42 | | 6574.53 | 99.24 | 6590.93 | 99.4 | 6600.77 | 99.25 | 6607.33 | 99.37 |
| 6617.17
6754.92 | | 6633.57
6768.04 | | 6659.81
6790.99 | 99.03 | 6709
6797.55 | | 6715.56
6807.39 | 99.09
98.86 |
| 6827.07 | | 6836.91 | | 6856.59 | | 6876.27 | | 6889.39 | 98.34 |
| 6895.94 | | 6905.78 | 98.39 | 6918.9 | | | 98.21 | 6948.42 | 98.22 |
| 6961.54
7050.09 | 98.53 | 6981.22 | 98.42 | 7000.9
7063.21 | | 7023.85
7089.45 | | 7027.13
7109.13 | 99.05
101.26 |
| 7115.68 | 101.1 | | | | | | | 7191.12 | 101.13 |
| 7210.8 | 101.21 | | | 7233.75 | | 7246.87 | | 7263.27 | 101.11 |
| 7273.11
7322.31 | 101.13 | | | 7299.35
7345.26 | | 7302.63
7351.82 | | 7319.03
7358.38 | 100.99
100.98 |
| 7364.94 | | 7371.5 | | 7378.06 | | 7384.62 | 101 | 7397.74 | 101.35 |
| 7404.3 | 101.16 | | | 7453.49 | | 7460.05 | 101.56 | 7483.01 | 101.49 |
| 7505.97
7565 | 101.29 '
101.65 ' | | | 7532.21
7617.48 | | 7538.77
7627.32 | | 7561.72
7643.72 | 101.47
101.47 |
| 7647 | 101.66 | | | 7683.07 | | 7712.59 | | 7719.15 | 101.65 |
| 7735.55 | 101.35 | | | 7751.95 | | | | 7768.34 | 101.57 |
| 7774.9
7840.5 | 101.36
101.13 | 7791.3
7856.9 | 101.24 | 7807.7
7873.29 | | 7827.38
7876.57 | | 7833.94
7892.97 | 101.29
100.86 |
| 7902.81 | 101.03 | 7915.93 | 100.83 | 7925.77 | 100.91 | 7942.17 | 100.63 | 7948.73 | 100.78 |
| 7955.29
8024.16 | 100.47 | | | 7994.64
8079.92 | | 7997.92
8086.47 | 100.56 | 8017.6
8122.55 | 100.43
100.21 |
| 8138.95 | 100.33 | | | | | 8191.43 | 99.79 | 8211.1 | 99.88 |
| 8227.5 | 99.83 | 8243.9 | | | | 8270.14 | | 8299.66 | 99.75 |
| 8316.05
8394.77 | 99.62 | 8325.89
8421 | | 8348.85
8427.56 | 99.77 | 8358.69 | | 8365.25 | 99.7
99 |
| 8460.36 | | | | 8476.76 | 98.37 | 8434.12
8496.44 | | 8506.28 | 98.07 |
| 8516.12 | 97.33 | 8525.95 | 97.54 | 8548.91 | 97.24 | 8562.03 | 97.81 | 8598.11 | 97.84 |
| 8611.23
8647.3 | 105.87 | 8617.79
8686.66 | | 8621.07
8722.74 | | 8624.35
8752.25 | | 8640.74
8798.17 | 105.57
105.72 |
| 8837.53 | 105.51 | 8860.48 | 105.25 | 8876.88 | 105.29 | 8922.8 | 105.63 | 8945.76 | 105.41 |
| 8971.99
9070.38 | 105.41 8 | | | 9017.91
9126.14 | 105.49 | 9040.87
9132.7 | 105.71 | 9050.7
9158.93 | 105.64
105.43 |
| 9185.17 | 105.37 | | 105.5 | 9260.6 | | 9267.16 | | 9286.84 | 105.44 |
| 9322.92 | 105.77 | | | 9385.23 | | 9391.79 | | 9424.59 | 105.9 |
| 9454.1
9624.64 | 106.02
105.74 | 9486.9
9634.48 | | 9572.17
9677.12 | | 9578.73
9719.75 | | 9604.97
9742.71 | 105.69
105.49 |
| 9749.27 | 105.37 | 9801.75 | 105.41 | 9844.38 | | 9867.34 | | 9913.25 | 105.71 |
| 9926.37 | 105.57 | | | 10001.81 | | 10014.92 | | 10024.76 | 105.26 |
| 10060.84
10188.75 | 105.0710 | | | 10132.99
10221.54 | | L0139.55
L0234.66 | | 10178.91
10254.34 | 105.2
105.24 |
| 10270.74 | 105.1110 | | | 10333.05 | | 10356.01 | | 10392.08 | 104.94 |
| 10398.64 | 105.0210 | | 104.78 | 10438
10516.71 | | L0451.12
L0529.83 | | 10464.24 | 104.78 |
| 10483.92
10559.35 | 104.71 | 0503.59
0569.19 | | 10510.71 | | L0529.63 | | 10546.23
10611.82 | 104.76
99.54 |
| 10621.66 | 99.431 | 0638.06 | 99.83 | 10661.02 | 100.111 | L0680.69 | 99.94 | 10687.25 | 99.65 |
| 10697.09
10762.69 | 99.561 | 0713.49
0782.36 | | 10723.33
10795.48 | | L0736.45
L0802.04 | | 10746.29
10831.56 | 100.84
100.97 |
| 10762.69 | 100.981 | | | 10793.48 | | 10902.04 | | 10913.55 | 100.57 |
| 10933.23 | 100.31 | 0946.35 | 100.41 | 10959.47 | 100.32 | 10969.3 | 100.03 | 10982.42 | 100.58 |
| 10998.82
11087.37 | 100.691 | | | 11054.58
11126.73 | | L1061.14
L1139.85 | | 11080.81
11156.24 | 103.85
104.43 |
| 11189.04 | 104.261 | | | 11208.72 | 104.35 | 11212 | | 11221.84 | 98.08 |
| 11244.8 | | 1254.63 | | 11343.19 | | 11346.47 | | 11353.02 | 102.7 |
| 11356.3
11408.78 | 103.711 | | | 11369.42
11425.18 | | L1375.98
L1441.58 | | 11395.66
11451.41 | 104.52
104.71 |
| 11464.53 | 104.491 | | 104.54 | | | | , , = 3. | | . = |
| Manning's | n Walue | g. | num= | 5 | | | | | |
| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
| 0 | .132 | 5462.2 | .066 | 5598.1 | .015 | 5769.92 | .066 | 6047.74 | .076 |
| Bank Sta: | Left I | Right | Length | s: Left Cl | nannel | Right | Coef: | E Contr. | Expan. |
| | 462.2 60 | | | 1187.43 | 1110 | 998.61 | | .1 | . 3 |
| Ineffectiv | AG LTOM | num= | - | 1 | | | | | |
| | | | | | | | | | |

```
Sta L Sta R Elev Permane
0 5462.2 99.18 T
Left Levee Station= 113.19
Right Levee Station=11107.05
                                                                                                                                                                                                                           Elevation= 114.24
Elevation= 104.67
| Star | 
CROSS SECTION OUTPUT Profile #Design Flow
          E.G. Elev (ft)
Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                                                             106.73
                                                                                                                                                                                                                                                                                                                                                                                                                  Left OB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Right OB
                                                                                                                                                                                                                                              Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                                                                                                                                                                                                                                                                                                            0.132
1187.43
3019.68
                                                                                                                                                                                            0.61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   0.054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0.076
                                                                                                                                                                 106.12
91.35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1110.00
13267.74
13267.74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            998.61
       Crit W.S. (ft) 91.35

E.G. Slope (ft/ft) 0.001089

Q Total (cfs) 125000.00

Top Width (ft) 6557.37

Vel Total (ft/s) 3.62

Max Chl Dpth (ft) 39.68

Conv. Total (cfs) 3787529.0

Length Wtd. (ft) 1083.50

Min Ch El (ff)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       18264.03
                                                                                                                                                                                                                                          Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                                                                                                                                                                                                                                                                               3159.23
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       18264.03
                                                                                                                                                                                                                                                                                                                                                                                                                        3506.17
                                                                                                                                                                                                                                                                                                                                                                                                                545.20
1.16
5.54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    585.54
7.16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5426.63
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1.45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         22.66
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 801428.8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2879863.0
601.33
                                                                                                                                                                                                                                                                                                                                                                                                               106237.7
                                                                                                                                                                                                                                                                                                                                                                                                                    546.53
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5432.09
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Shear (lb/sq ft) Stream Power (lb/ft s)

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Cum Volume (acre-ft) 120910.40 46992.86 Cum SA (acres) 17296.94 2124.92

66.44 3.02 0.39 0.09

num=

Elev Permanent

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

0.38

1.50 10.75

0.23

157601.50

CROSS SECTION

RIVER: Rio Grande

Station Elevation Data

Min Ch El (ft) Alpha

Frctn Loss (ft) C & E Loss (ft)

RS: 153.61 REACH: Lower Reach

Description: RGV-04, Updated on left with new survey to Station 1284.94. Bathymetric elevations translated from IBWC 2008 Cross-sections 466

| DCGCIOII L | 10,00101 | - Daca | 110111 | 100 | | | | | |
|------------|----------|---------|--------|---------|--------|---------|--------|---------|--------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 100.43 | 15 | 100.42 | 38.99 | 100.65 | 90.99 | 100.58 | 107.99 | 100.7 |
| - | | | | | | | | | |
| 111.99 | 101.06 | 117.99 | 102.8 | 122.99 | 101.27 | 127.99 | 99.42 | 130.99 | 99.52 |
| 146.99 | 100.69 | 160.99 | 95.17 | 167.99 | 94.09 | 169.99 | 94.16 | 178.99 | 95.81 |
| | | | | | | | | | |
| 185.99 | 97.47 | 191.99 | 99.51 | 203.99 | 100.34 | 214.99 | 102.4 | 220.98 | 103.84 |
| 230.98 | 107.04 | 239.98 | 111.28 | 247.98 | 113.43 | 255.98 | 113.89 | 267.98 | 113.73 |
| 275.98 | 110.83 | 283.98 | 107.02 | 288.98 | 105.52 | | | 1284.94 | 105.51 |
| | | | | | | | | | |
| 1934.7 | 106.46 | 1937.98 | 106.68 | 1944.53 | 108.49 | 1951.09 | 109.56 | 1970.77 | 111.52 |
| 1977.33 | 112 67 | 2000.28 | 113 02 | 2026.51 | 112 76 | 2049.47 | 111.85 | 2075.7 | 109.89 |
| | | | | | | | | | |
| 2101.93 | | 3816.88 | | 3820.16 | 106.71 | 3826.72 | | 3829.99 | 109.3 |
| 3849.67 | 109.74 | 3875.9 | 111.46 | 3895.58 | 113.75 | 3915.25 | 115.27 | 3941.48 | 115.54 |
| 3944.76 | | 3951.32 | | 3957.88 | | 3970.99 | | 3990.67 | 99.83 |
| | | | | | | | | | |
| 4000.51 | | 4013.62 | | 4020.18 | | 4030.02 | | 4049.69 | 91.76 |
| 4062.81 | 92.54 | 4072.64 | 93.51 | 4079.2 | 94.96 | 4089.04 | 94.6 | 4115.27 | 95.32 |
| 4154.62 | | 4161.18 | | 4180.86 | | | | | |
| | | | | | | 4197.26 | | 4200.54 | 96.27 |
| 4216.93 | 97.13 | 4266.12 | 97.41 | 4275.96 | 97.28 | 4295.63 | 97.9 | 4328.43 | 96.74 |
| 4338.27 | 96.61 | 4348.1 | 96.08 | 4364.5 | 96 15 | 4384.18 | 96 01 | 4397.29 | 96.27 |
| | | | | | | | | | |
| 4413.69 | | 4420.25 | | 4446.48 | 96.09 | 4459.6 | | 4492.39 | 96.24 |
| 4505.51 | 96.54 | 4531.74 | 97.64 | 4538.3 | 98.51 | 4551.42 | 98.4 | 4577.65 | 99.35 |
| 4607.17 | 00 75 | 4617.01 | 00 12 | 4623.56 | 00 00 | 4659.64 | 99.2 | 4666.2 | 98.96 |
| | | | | | | | | | |
| 4676.03 | | 4692.43 | | 4715.38 | | 4721.94 | 98.96 | 4744.9 | 99.54 |
| 4758.02 | 99.52 | 4764.57 | 99.81 | 4777.69 | 99.3 | 4797.37 | 99.05 | 4813.76 | 99.49 |
| 4826.88 | 98.99 | 4840 | | | | 4872.79 | 99.16 | | 99.67 |
| | | | | 4853.11 | | | | 4902.3 | |
| 4908.86 | 99.4 | 4925.26 | 99.92 | 4931.82 | 99.34 | 4948.21 | 99.13 | 4961.33 | 99.34 |
| 4974.45 | 99 1 | 4994.12 | 99 03 | 5020.36 | 99 57 | 5046.59 | 99 28 | 5062.99 | 99.61 |
| | | | | | | | | | |
| 5069.55 | | 5095.78 | | 5115.46 | 99.54 | 5125.3 | | 5144.97 | 99.45 |
| 5167.93 | 99.81 | 5177.77 | 99.49 | 5200.72 | 99.88 | 5223.68 | 99.49 | 5230.23 | 99.66 |
| 5249.91 | 99.21 | 5282.7 | 99 66 | 5302.38 | 99.6 | 5308.94 | 00 83 | 5325.33 | 99.66 |
| | | | | | | | | | |
| 5341.73 | 100.14 | 5351.57 | 99.81 | 5364.69 | 99.98 | 5371.24 | | 5381.08 | 99.39 |
| 5387.64 | 99.76 | 5394.2 | 100.82 | 5407.32 | 101.46 | 5413.87 | 101.32 | 5420.43 | 100.31 |
| 5430.27 | | | | | | | | | |
| | | 5446.67 | | 5466.34 | 99.45 | 5489.3 | | 5499.14 | 99.48 |
| 5512.25 | 99.33 | 5525.37 | 99.78 | 5541.77 | 99.7 | 5558.16 | 98.76 | 5564.72 | 98.64 |
| 5574.56 | 97 7 | 5594.24 | 96 31 | 5600.79 | 96 16 | 5610.63 | 96 57 | 5627.03 | 96.04 |
| | | | | | | | | | |
| 5633.59 | | 5640.15 | | 5649.98 | | 5656.54 | | 5669.66 | 93.19 |
| 5686.06 | 94.57 | 5692.61 | 92.58 | 5705.73 | 84.43 | 5712.29 | 81.81 | 5718.85 | 78.08 |
| 5728.69 | 72 25 | 5731.97 | 72 | 5734.97 | 5/ 25 | 5742.97 | 5/ / | 5752.97 | 54.3 |
| | | | | | | | | | |
| 5753.47 | 54.3 | 5757.97 | 54.54 | 5761.97 | 54.7 | 5763.97 | 54.88 | 5769.97 | 55.41 |
| 5772.97 | 55 6 | 5776.97 | 56 53 | 5876.26 | 73 | 5882.81 | 73 21 | 5889.37 | 77.34 |
| 5895.93 | | 5899.21 | | | | | | | |
| | | | | 5915.61 | | 5925.45 | | 5941.84 | 83.68 |
| 5964.8 | 84.59 | 5974.64 | 85.67 | 5994.31 | 89.3 | 6007.43 | 93.08 | 6020.55 | 95.36 |
| 6027.1 | 97.05 | 6043.5 | 98 53 | 6056.62 | 98 56 | 6073.01 | 99 06 | 6099.25 | 99 |
| | | | | | | | | | |
| 6109.09 | 99.19 | 6122.2 | | 6132.04 | | 6145.16 | | 6191.07 | 99.06 |
| 6207.47 | 98.83 | 6217.3 | 99.03 | 6256.66 | 98.87 | 6282.89 | 99 | 6305.85 | 98.84 |
| 6322.24 | 00 01 | 6351.76 | | 6368.15 | | 6391.11 | | 6404.23 | 98.78 |
| | | | | | | | | | |
| 6443.58 | 98.74 | 6459.97 | | 6482.93 | 98.68 | 6505.88 | 98.61 | 6561.63 | 98.71 |
| 6564.91 | 98.5 | 6578.03 | 98.81 | 6607.55 | 98.67 | 6682.97 | 98.8 | 6689.53 | 98.99 |
| 6705.93 | | 6761.67 | | 6778.07 | | 6810.86 | | 6823.98 | 98.91 |
| | | | | | | | | | |
| 6879.73 | | 6935.48 | | 6978.11 | | 6991.23 | | 7007.62 | 98.75 |
| 7017.46 | 98.92 | 7046.97 | 98.81 | 7079.77 | 98.99 | 7106 | 98.91 | 7128.96 | 98.65 |
| 7145.36 | | 7155.19 | | 7187.99 | 98.91 | 7201.1 | | 7224.06 | 98.73 |
| | | | | | | | | | |
| 7253.57 | 98.57 | 7283.09 | 98.66 | 7302.76 | 98.31 | 7309.32 | | 7325.72 | 98.4 |
| 7342.12 | 98 6 | 7358.51 | 98 4 | 7388.03 | 98.56 | 7404.42 | 98 29 | 7420.82 | 98.56 |
| | | | | | | | | | |
| 7473.29 | | 7489.69 | | 7506.08 | | 7515.92 | | 7532.32 | 98.63 |
| 7558.55 | 98.48 | 7574.95 | 98.67 | 7581.51 | 98.44 | 7604.46 | 98.54 | 7640.54 | 98.21 |
| 7663.49 | | 7683.17 | | 7699.56 | 98.46 | 7712.68 | | 7735.64 | 98.31 |
| | | | | | | | | | |
| 7752.03 | 98.11 | 7781.55 | | 7794.67 | | 7840.58 | | 7876.65 | 97.43 |
| 7883.21 | 96.98 | 7893.04 | 96.98 | 7909.44 | 96.37 | 7929.12 | 96.15 | 7981.59 | 96.4 |
| 8007.82 | | 8030.78 | 96.36 | 8106.2 | | 8171.79 | | 8207.86 | 96.05 |
| | | | | | | | | | |
| 8217.7 | | 8250.49 | | 8289.84 | 96.07 | | | 8339.03 | 96.05 |
| 8345.59 | 95.94 | 8411.18 | 96.03 | 8460.37 | 95.7 | 8503 | 95.6 | 8516.12 | 95.24 |
| 8525.95 | | 8552.19 | | 8562.03 | | 8568.58 | | 8571.86 | 98.14 |
| | | | | | | | | | |
| 8575.14 | 100.06 | 8591.54 | 100.45 | 8598.1 | 100.36 | 8653.85 | 100.57 | 8680.08 | 100.91 |
| 8706.31 | 100 48 | 8719.43 | 100 74 | 8745.67 | 100 86 | 8768.62 | 100 74 | 8840.77 | 100.56 |
| | | | | | | | | | |
| 8880.12 | | 8916.19 | | 8932.59 | 100.63 | 8978.5 | | 9008.01 | 100.34 |
| 9014.57 | 100.14 | 9080.15 | 100.14 | 9106.39 | 99.95 | 9129.34 | 100.08 | 9165.42 | 99.92 |
| 9181.81 | | 9201.49 | | 9234.28 | | 9253.96 | | 9273.63 | 99.93 |
| | | | | | | | | | |
| 9283.47 | | 9296.59 | | 9329.38 | | 9362.17 | | 9365.45 | 99.68 |
| 9411.36 | 99.46 | 9460.55 | 99.65 | 9473.67 | 99.43 | 9519.58 | 99.6 | 9539.26 | 99.79 |
| | | | | | | | | | |

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99.59 9581.89
                                                                                                            99.72 9631.08
                                                                                                                                                    99.58 9647.47
  9673.71
9755.69
                         99.23 9693.38
100.47 9768.81
                                                                    99.26 9709.78
                                                                                                          100.33 9722.9
                                                                                                                                                    99.65 9736.01
102.49 9785.2
                                                                                                                                                                                         100.22
101.73
                                                                                                          102.24 9781.92
                                                                                                                                                   95.58 9831.11
   9798.32
                         101.04 9804.88
                                                                 100.34 9811.44
                                                                                                           98.82 9821.28
                                                                                                                                                                                             91.87
                           90.56 9844.23
93.76 9945.89
                                                                   90.07 9880.3
95.6 9955.73
                                                                                                           89.99 9919.65
99.75 9962.29
                                                                                                                                                 90.23 9926.21
101.53 9981.96
   9837.67
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 9988.52
10077.06
                         101.7510004.92
101.0710090.18
                                                                102.3210024.59
100.9210103.29
                                                                                                         101.9210044.27
101.0810109.85
                                                                                                                                                  101.0810054.11
                                                                                                                                                  100.5910122.97
 10149.21
                         100.0210159.04
                                                                   99.7210198.39
                                                                                                              99.110214.79
99.610283.66
                                                                                                                                                   99.0110224.63
                                                                                                            98.2710404.99
                           98.45 10355.8
98.39 10467.3
                                                                                                                                                    98.4710431.22
98.1310582.07
 10326.29
                                                                   98.5210378.76
                                                                                                                                                                                             98.25
                                                                    98.1810503.37
                                                                                                           98.2910549.28
                                                                                                          9810650.94
97.9510913.28
 10598.47
                            98.1310618.14
                                                                   98.2210631.26
                                                                                                                                                    98.1610680.45
                                                                                                                                                    97.8410923.12
97.99 11083.8
 10772.27
                           98.0210811.62
                                                                      97.910883.77
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 10952.63
                                                                    97.9611008.38
                                                                                                           97.8911067.41
                           97.8310995.26
                                                                                                                                                                                             97.82
 11126.44
                           97.9611224.81
97.4811365.82
                                                                   97.5811300.24
97.3211382.22
                                                                                                           97.5111323.19
97.4911388.78
                                                                                                                                                    97.6211329.75
97.89 11401.9
                                                                                                                                                                                             97.48
                                                                                                                                                 98.6611500.28
101.2411539.63
                                                                                                         97.45 11464.2
100.7711529.79
 11408.46
                           98.0911437.97
                                                                    97.0911447.81
                                                                                                                                                                                               98.6
 11552.74
                           99.1411562.58
                                                                    97.1711569.14
                                                                                                              96.311585.54
                                                                                                                                                          96 11592.1
                                                                                                                                                                                             96.14
                                                                                                                                                     97.311746.22
                           97.6111634.73
97.3411798.69
                                                                   97.3511657.68
97.5911821.65
 11615.05
                                                                                                           97.5511674.08
 11779.02
                                                                                                              97.6
                                                                                                                               11861
                                                                                                                                                    97.9611870.84
                                                                                                                                                                                             98.84
                                                                                                       99.611900.35
102.9211942.98
 11877.39
11916.75
                         100.6911880.67
101.81 11923.3
                                                                101.0411887.23
102.8111929.86
                                                                                                                                                98.1311906.91
102.2811949.54
                                                                                                                                                                                               98.4
                                                                                                                                                                                         101.94
  11956.1
                           97.3311962.66
                                                                   97.1512185.65
                                                                                                           97.1512188.93
                                                                                                                                                   97.7812198.77
                            102.812218.44
                                                                                                        104.8512261.07
 12300.42 104.78
Manning's n Values num=
                                                                                             Sta
                                                                                                          n Val
                                                                                                                                     Sta
                                                                                                                                                  n Val
                                                                                                                                                                             Sta
                                                                                                                                                                                            n Val
                                                                    .07 5718.85
                            .066 5525.37
                 0
                                                                                                              .025 5895.93
                                                                                                                                                       .07 6073.01
                                                                                                                                                                                               .066
Bank Sta: Left Right 5525.37 6073.01
                                                                                                                                                                                             Expan
                                                                                                                                                                         .1
                                                                   1342.72 1110
                                                                                                                                 910
                                                  num= 2
Elev Permanent
 Ineffective Flow
       Sta L Sta R
0 5525.37
                                               99.78
99.06
   6073.0112300.42
                             Station= 255.98
Station=12244.68
 Left Levee
                                                                                              Elevation= 113.89
                                                                                              Elevation= 104.85
| Star | 
                                                                                          2
 CROSS SECTION OUTPUT Profile #Design Flow
```

| E.G. Elev (ft) | 106.25 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|-----------|-----------|-----------|
| Vel Head (ft) | 0.33 | Wt. n-Val. | 0.066 | 0.030 | 0.066 |
| W.S. Elev (ft) | 105.93 | Reach Len. (ft) | 1342.72 | 1110.00 | 910.00 |
| Crit W.S. (ft) | 90.14 | Flow Area (sq ft) | 9447.23 | 12395.95 | 40253.86 |
| E.G. Slope (ft/ft) | 0.000179 | Area (sq ft) | 11952.38 | 12395.95 | 46335.25 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 9457.20 | 73493.55 | 42049.25 |
| Top Width (ft) | 8332.71 | Top Width (ft) | 1557.66 | 547.64 | 6227.41 |
| Vel Total (ft/s) | 2.01 | Avg. Vel. (ft/s) | 1.00 | 5.93 | 1.04 |
| Max Chl Dpth (ft) | 51.68 | Hydr. Depth (ft) | 6.07 | 22.64 | 6.46 |
| Conv. Total (cfs) | 9338528.0 | Conv. (cfs) | 706530.8 | 5490573.0 | 3141425.0 |
| Length Wtd. (ft) | 1063.45 | Wetted Per. (ft) | 1560.42 | 574.91 | 6237.44 |
| Min Ch El (ft) | 54.25 | Shear (lb/sq ft) | 0.07 | 0.24 | 0.07 |
| Alpha | 5.21 | Stream Power (lb/ft s) | 0.07 | 1.43 | 0.08 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 120704.40 | 46665.88 | 156861.00 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 17268.28 | 2110.49 | 19608.72 |

Warning: The cross-section end points had to be extended vertically for the computed water surface. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

num=

Station Elevation Data

RS: 153.36 REACH: Lower Reach

INPUT

Description: RGV-04, Updated on left with new survey to Station 993.99.

Bathymetric elevations translated from IBWC 2008 Cross-sections 459

Sta Elev 0 108.21 97.25 Sta 111.1 111.21 25 60 68 87 97.25 101.66 97.66 101.77 118 310 100.34 150 333 189 337 100.52 101.26 101.14 280 100.65 94.82 353 100.84 370 99.69 384 95.05 391 94.14 430 561 95.12 589.99 95.02 630.99 95.54 829.99 478 95.06 871.99 96.13 910.99 97.3 950.99 99.75 1072.44 99 3 976.99 99 67 993 99 99 65 1026.53 99.56 1046.21 99.48 99.46 99.28 1111.8 99.52 1190.51 1131.48 99.28 1154.43 99.31 1262.66 1288.9 99.42 99.94 1361.05 99.83 1613.58 99.88 1410.25 99.74 1682.46 100.05 1429.92 100.02 1689.01 99.93 1488.96 99.89 1738.21 1521.75 100.15 1780.84 1905.47 100.24 1790.68 100.85 1921.87 100.54 1823.48 100.7 1944.83 100.39 1846.44 100.94 1997.3 100.69 1875.95 100.67 2046.49 100.58 2121.93 101.45 2207.2 92.19 2735.24 100.83 2138.33 100.84 2217.04 100.65 2151.45 97.99 2230.16 101.2 2167.84 95.18 2240 2069.45 2200.64 97.3 2817.23 2725.4 93.19 2751.64 96.23 2771.31 97.35 97.8 2872.99 97.99 2991.06 97.6 2879.55 97.61 3017.29 97.94 2902.5 97.63 3030.41 97.54 2935.3 97.9 3053.37 2836.91 97.82 2964.82 3059.93 3233.76 98.1 3073.05 97.7 3246.88 97.65 3109.13 97.22 3256.71 97.74 3148.48 97.49 3289.51 97.58 3217.36 97.4 3312.47 97.49 3345.27 97.87 3456.78 97.75 97.58 3378.06 97.79 3489.57 3328.87 3371.5 96.98 3397.74 98.65 98.15 3466.62 98.23 3499.41 3437.1 3525.65 98.34 3542.05 97.69 3568.29 97.87 3581.41 98.23 3601.09 97.96 98.36 3640.44 97.57 3781.47 97.58 3866.74 97.7 3997.93 97.94 3686.36 97.86 3801.15 98.05 3706.04 97.55 3817.55 98.07 3830.67 3774.91 3856.9 3991.37 97.78 3899.54 97.36 4011.05 97.39 3929.06 97.75 4034.01 97.64 3974.97 97.6 4043.85 98.18 4063.53 97.88 4076.65 97.13 4089.76 97.55 4138.96 97.9 4148.8 97.46 97.69 4306.23 97.99 4437.42 97.47 4555.49 97.79 4696.51 97.95 4808.02 97.65 4352.14 97.59 4453.81 98.05 4578.44 4257 03 97.94 4361.98 97.62 4398.06 97 72 97.78 4460.37 97.59 4598.12 97.46 4496.45 98.07 4644.04 4525.97 98.12 4673.56 98.21 4716.19 98.68 4821.14 97.92 4745.71 98.22 4850.66 98.37 4778.51 98.01 4863.78 97.8 98.31 4794.91 97.94 4909.7 98.14 4916.26 97.63 5037.61 98.36 4972.01 97.56 5096.64 4873.62 97.77 4939.21

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97.84 5158.96
                                                                 97.79 5208.15
                98.03 5342.62
99.61 5575.48
                                        98.01 5506.61
                                                                 98.74 5539.4
97.23 5598.44
                                                                                         99.48 5545.96
92.84 5611.56
                                                                                                                 99.01
90.53
                                                                  90.5 5693.55
 5634.52
                89.36 5654.19
                                          90.7 5667.31
                                                                                         90.92 5700.11
                                                                                                                 90.18
 5706.67
5765.87
                88.16 5716.51
70.84 5775.87
                                         86.84 5726.35
                                                                 86.78 5732.91
                                                                                          84.9 5755.87
                                         70.24 5835.87
                                                                 69.04 5855.87
                                                                                         68.84 5895.87
                68.44 5925.87
73 5959.24
                                         68.44 5935.87
73.08 5965.8
                                                                 69.74 5945.87
75.33 5978.92
                                                                                         69.84 5955.87
81.34 5988.76
 5955.96
                94.21 6005.17
97.88 6201.98
97.95 6369.28
 5998.6
6087.17
                                        97.23 6011.73
                                                                98.24 6018.29
98.12 6283.99
                                                                                         97.65 6044.53
97.84 6326.63
 6352.88
                                         98.07 6428.32
                                                                 98.02 6474.25
                                                                                         97.71 6520.17
                                                                                                                 97.75
                                                                                        97.71 6520.17
97.53 6779.31
97.28 7035.17
97.43 7291.04
97.32 7569.86
                97.6 6589.06
97.39 6890.84
                                        97.65 6661.22
97.18 6949.89
                                                                97.41 6716.99
97.16 6959.73
   6831.8
 7071.26
7317.28
                97.47 7136.86
97.23 7399.29
                                        97.31 7169.67
97.41 7412.41
                                                                97.52 7222.15
97.13 7432.09
                                                                                                                 97.02
 7599.38
                97.27 7664.99
97.04 7851.96
                                        97.15 7678.11
                                                                97 7717.47
95.86 7914.29
                                                                                         97.11 7786.36
92.39 7963.49
                                                                                                                 96.91
                                         96.58 7881.49
                                                                90.95 8196.39
90.79 8262
                91.54 8078.3
91.37 8248.88
87.7 8304.64
                                        91.63 8173.43
90.61 8255.44
 8058.62
                                                                                         91.03 8225.92
                                                                90.79 8262
82.62 8344.01
                                                                                         89.04 8271.84
                                                                                        82.85 8347.29
 8298.08
                                        86.13 8334.17
                                                                                                                 83.72
                88.56 8363.69
99.87 8448.98
                                        89.17 8389.93
99.04 8478.5
                                                                90.39 8399.77
98.86 8537.54
 8357 13
                                                                                             93 8416.17
 8432.57
                                                                                         98.73 8563.79
                                        99.34 8596.59
98.71 8721.24
                98.61 8580.19
98.37 8695
                                                                97.93 8609.71
98.11 8750.76
                                                                                        99.24 8622.83
98.58 8793.4
 8573.63
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                98.42 8839.33
                                        97.84 8901.65
92.19 9009.9
91.83 9433.06
                                                                97.48 8931.18
91 9032.86
93.33 9442.9
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 8813.09
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                98.42 8839.33
97.7 9000.06
90.18 9426.5
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                                                                                        94.53 9459.3
95.9 9551.15
95.67 9711.88
 9403.54
                                                                                                                 92.42
                                        96.03 9524.91
95.11 9620.03
95.7 9823.41
                                                                96.49 9534.75
95.43 9682.36
 9488.82
9580.67
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     9725
                95.76 9764.37
                                                                 95.14 9852.93
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                95.06 9993.98
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 9938.22
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                                                                                                                 95.08
                                                                                        95.4410495.87
96.8410761.57
                                        95.1810413.86
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96.9211283.13
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                                                                                                                 95.65
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95.7411499.63
90.17 11571.8
 11404 5
                                        96.4311424.18
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                                          95.111516.03
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11555.39
                                        90.1311578.36
                                                                89.6311975.27
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97.5112270.49
97.4512365.62
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98.412296.74
98.5312437.79
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98.85 12319.7
9612460.75
                                        97.2812149.12
98.5812283.62
                                                                                                                 97.78
12067.12
12250.81
12349.22
                                        98.5612411.55
                                                                                                                  96.6
                                                                                        97.4112555.88
97.5312657.57
                96.0212490.27
97.3112588.68
                                        97.2912506.67
97.6212628.04
                                                                96.9912523.08
96.6412651.01
12467.31
                                                                                                                  97 2
                97.0412736.29
97.4112828.14
97.6112923.27
                                                                                        96.54 12785.5
97.7812880.62
12683.81
                                        96.7312749.41
                                                                96.9712765.82
                                                                                                                 96.59
                                          96.912841.26
                                                                 97.5212864.22
                                                                                        96.7312992.15
96.8713077.44
97.7513175.85
                                                                97.3112979.03
12913.43
                                        99.0412939.67
                                                                                                                 97.15
13002
13103.68
                97.9213120.08
95.3413221.77
101.613310.34
                                        97.1413139.77
                                                                97.6613156.17
                                                                                                                 95.53
                                       97.6413261.14
101.57 13316.9
96.1113385.79
                                                                97.9713277.54
99.6113336.58
                                                                                         97.813290.66
96.6213352.98
13185.69
                                                                                                                 99 28
 13300.5
                                                                                                                 95.07
                                                                96.3113412.03
99.24 13549.8
99.2413618.69
13362 83
                95.0413375.95
                                                                                         95 2813487 48
                                        96.0313539.96
98.7913605.57
13569.48
                99.0413589.16
                                                                                       100.6713658.05
                                                                                                               100.71
                                                                                       100.9713723.66
13743.34 102.3413759.74
                                      102.2913772.86
                                                               104.2813789.26
Manning's n Values
                                       num=
             n Val Sta
.096 5559.08
                              Sta
                                      n Val Sta
                                                                                        n Val
                                                                                                                 n Val
                                                                n Val
                                                                .015 5965.8
                                                                                         .066 6011.73
                                      Lengths: Left Channel Right 1522.36 1400.85 1430.05
Bank Sta: Left Right 5559.08 6011.73
                                                                                          Coeff Contr.
Ineffective Flow
                               num=
                                                2
 Sta L Sta R
0 5559.08
6011.7313789.26
                              Elev Permanent
                            99.61
98.24
6011.7313789.26 98.24 T
Left Levee Station= 25 Elevation= 111.21
Right Levee Station=13789.26 Elevation= 104.94
Blocked Obstructions num= 3
Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev
2181.57 5557.15 99.63 6008.35 8413.97 98.24 8976.1712013.95 98.01
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                                Channel
                                                                                                                                Right OB
                                                         Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                 0.096
   Vel Head (ft)
                                             0.09
                                                                                                                  0.047
                                                                                                                                   0.085
   W.S. Elev (ft)
Crit W.S. (ft)
                                          105.89
                                                                                             1522.36
33465.58
                                                                                                                                1430.05
                                                                                                               1400.85
                                                                                                              11545.86
                                           92.55
                                                                                                                               58321.43
  E.G. Slope (ft/ft)
Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                 0.000204
125000.00
13748.67
                                                         Area (sq ft)
                                                                                             35904.46
                                                                                                             11545.86
                                                                                                                              60777.77
                                       125000.00
                                                          Flow (cfs)
                                                                                               24592.99
                                                                                                               44648.83
                                                                                                                                55758.19
                                                        Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                              5518 50
                                                                                                                 452.65
                                                                                                                                7777 53
                                           1.21
                                                                                                0.73
                                                                                                                   3.87
                                                                                                                  25.51
   Max Chl Dpth (ft)
                                                                                                   6.06
                                                                                                                                     7.50
   Conv. Total (cfs)
Length Wtd. (ft)
                                                        Conv. (cfs)
Wetted Per. (ft)
                                       8752444.0
                                                                                               1721990.0
                                                                                                                 3126291.0
                                                                                                                                   3904163.0
                                                                                                                                7782.93
                                        1428.98
                                                                                                                465.13
                                                                                               5521.24
   Min Ch El (ft)
                                           68.44
                                                         Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                   0.08
                                                                                                                0.32
                                                                                                                                    0.10
                                                                                                   0.06
                                             4.00
   Alpha
                                                                                            119966.80
   Frctn Loss (ft)
C & E Loss (ft)
                                                        Cum Volume (acre-ft)
Cum SA (acres)
                                            0.17
                                                                                                               46360 83
                                                                                                                               155742 20
                                             0.04
                                                                                             17159.22
                                                                                                               2097.74
                                                                                                                             19462.44
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
             Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
Note:
RIVER: Rio Grande
REACH: Lower Reach
                                       RS: 153.08*
TNPIIT
Description: RGV-04
Station Elevation Data
                                       num=
       Sta Elev
0 106.9
                                          Elev
                                                   Sta
15.13
                                                                  Elev
                             8.03
                                      109.22
                                                             110.33
                                                                            28.67
                                                                                      110.64
                                                                                                    56.06
                98.44
                                        97.72
                                                  103.33
                                                                99.78
                                                                          124.66
                                                                                          99.9
                                                                                                       176
```

```
616.04
891.49
                 93.76
                           622.07
                                         94.85
                                                     646.6
                                                                  94.55
                                                                            724.52
975.68
                                                                                          94.53 753.04
97.4 1005.59
                                                                                                                  94.88
97.64
                                                                                          97.29 1105.24
97.78 1293.21
97.7 1541.73
                                                                                                                  97.75
  1019.53
               100.12 1049.18
                                        100.14 1057.19
                                                                  99.86 1089.23
                                                                  97.81 1248.09
97.74 1473.66
  1125.27
                 97.44 1181.93
                                         97.46
                                                       1209
                                         98.02 1395.46
  1311.25
                 97.82 1365.39
                                                                                                                  97.99
                                         98.16 1641.84
98.72 1831.54
                                                                  98.38 1672.15
98.56 1876.65
                                                                                          98.24
98.75
                                                                                                   1693.2
1897.7
                 97.89 1633.05
                 98.43 1783.43
                                                                                                                   98.58
  1720.26
  1945.83
                 98.78 1960.87
                                         98.62
                                                  1972.9
                                                                  98.99 1987.93
                                                                                          98.71 2018.01
                                                                                                                  99.19
                                                                  95.04 2054.1
93.27 2499.21
                                         93.19 2366.66
96.7 2583.42
96.96 2691.69
                                                                                          93.32 2508.24
97.12 2634.56
97.26 2742.83
  2178.45
                 93.19 2278.56
                                                                                                                  93.97
                 95.98 2541.31
97.23 2661.62
97.29 2818.01
                                                                  96.79 2601.47
96.9 2718.76
                                                                                                                   97.05
  2640.57
                                         97.08 2939.3
96.63 3037.56
                                                                                          97.7 2967.33
96.64 3067.64
  2778.91
                                                                  97.15 2959.32
  2987.36
                 96.66 3016.51
                                                                  96.91 3052.6
                                                                                                                  96.83
                                                                                          96.91 3169.9
97.25 3248.09
97.05 3380.42
97.21 3512.76
                                                                 97.45 3151.85
96.95 3233.05
  3091.69
3178.92
                 96.73 3097.71
                                         96.34 3115.76
97.16 3208.99
                                                                                                                    97.1
                 96.86 3199.97
                 97.23 3302.23
96.94 3446.59
97.02 3575.91
                                                                  97.3 3338.31
96.86 3500.73
  3284.18
                                         97.07 3320.27
                                                                                                                  97.13
                                         97.14 3485.69
96.81 3602.98
  3545.83
                                                                     97 3645.08
                                                                                           96.8 3660.12
                                                                                                                  97.03
  3699.22
3795.46
                 96.97 3708.24
97.23 3804.48
                                         97.36 3726.29
96.95 3822.53
                                                                 97.17 3738.32
97.53 3837.57
                                                                                          96.68 3750.34
97.06 3849.6
                                                                                                                   97.31
                                         97.11 3990.95
97.26 4150.35
97.88 4285.69
                                                                 97.34 3999.97
97.04 4177.42
97.69 4306.74
                 97.18 3948.85
97.01 4123.28
                                                                                          97.14 4051.1
97.55 4198.47
  3879.67
                                                                                                                   97.38
                 97.76 4258.62
                                                                                          97.95 4324.79
  4216.52
                                                                                                                  97.73
                 98.05 4376.91
97.83 4502.24
97.83 4598.48
97.77 4730.81
                                         97.88 4285.69
97.67 4396.97
97.96 4508.25
97.53 4619.53
97.88 4763.89
                                                                           4409
4529.3
                                                                 97.72 4529.3
97.79 4640.58
97.78 4801.38
                                                                                          98.11 4559.38
97.56 4673.66
97.91 4825.41
  4469.15
                                                                                                                  97.82
  4586.44
4691.71
                                                                                                                  97.93
  4841 43
                 99 12 4865 46
                                         98.12 4921.52
                                                                  97 72 4945 55
                                                                                           98.4 5013.63
                                                                                          99.28 5117.38
  5049.61
                 98.55 5073.69
                                         98.73 5097.72
                                                                  99.84 5110.01
                                                                                                                   97.71
                 94.52 5137.03
90.85 5215.64
                                         92.71 5154.23
87.36 5223.01
                                                                  91.34 5163.2991.57373 5168.96
86.92 5227.93 85.4 5245.12
   5127.2
                                                                                                                  91.72
                                         73.54 5289.7571.04794 5316.46
                                                                                          70.24 5334.65
  5252.61
                 74.45 5260.1
                                                                                                                  68.34
                 67.84 5384.97
71.33 5452.57
                                         67.84 5394.4968.51207 5402.96
74.65 5471.68 83.29 5485.58
                                                                                          69.11 5420.94 69.4
87.47 5494.6 89.5665
97.43 5561.78 97.3
  5437.93
                                         96.72 5539.42
97.23 5747.72
97.04 6045.83
                                                                            5546.6
  5506 42
                 91.76 5527.62
                                                                  98 01
                 97.58 5622.02
                                                                  97.29 5837.51
                                                                                                   5884.2
                                                                                          96.59 6232.73
  5912.94
                 96.93 5972.74
                                                                  96.58
                                                                           6096.1
                                                                                                                    96.2
                                                                 97.34 6545.84
97.23 6807.24
97.25 7073.01
97.15 7328.6
                 96.35 6308.21
                 97.2 6699.49
97.33 6968.85
97.02 7245.4
                                         97.41 6761.09
97.13 7058.65
96.96 7277.72
                                                                                          97.39 6864.7
97.04 7144.1
97.1 7363.92
                                                                                                                    97.3
  6659.97
  6940.12
  7183.23
                                                                                                                  96.91
                 96.97 7482.45
93.71 7676.38
92.6 7963.72
                                         96.76 7503.99
93.21 7780.54
                                                                  96.84 7554.27
93.02 7802.09
                                                                                          96.53 7586.6
93.05 7906.25
  7407.02
                                                                                                                  96 01
                                         92.37 7970.9
90.56 8042.72
  7931.38
                                                                  92.79 7988.86
                                                                                          92.29 7996.04
                                                                                                                  92.42
                 91.25 8013.99
                                                                  90.33 8049.91
                                                                                          89.28 8082.24
  8093.01
                 87.11 8107.38
                                           90.9 8114.56
                                                                  91.29 8143.29
                                                                                          92.06 8154.06
                                                                                                                  93.78
                                                                                         97.64 8304.91
97.84 8303.93
97.06 8538.36
98.23 8723.61
                                         98.38 8207.94
97.38 8351.61
                                                                  97.81 8240.26
  8333.65
                 98.22 8344.42
                                                                  97.88 8369.56
                                                                                                                  97.81
  8398.29
8578.24
                 97.43 8444.98
97.41 8622.96
                                         97.25 8477.31
98.65 8656.52
                                                                  97.44 8506.04
97.77 8715.22
                                                                                                                   98.68
  8748 78
                 99 25 8771 14
                                         99 08 8793 36
                                                                   98.4 8811.32
                                                                                          94.29 8822.09
                                                                                                                  93 23
                 92.05 8891.35
91.83 9278.22
                                         92.03 8933.29
92.86 9296.18
                                                                 91.74 8989.2
94.7 9314.14
                                                                                          91.78 9235.12
93.27 9346.46
  9253.08
                                                                                                                  93.92
                 95.59 9385.97
94.75 9605.05
                                                                 95.49 9414.7
94.93 9712.8
                                                                                          95.52 9447.02
94.56 9783.18
                                         95.92 9396.75
  9503.61
                                         94.97 9648.15
                                                                                                                  94.63
                                         94.73 9911.78
94.4310037.58
94.95 10157.8
94.7610305.97
                 94.55 9878.23
                                                                  94.67 9931.34
94.4410048.76
                                                                                          94.94 9959.31
94.7 10090.7
                                                                                                                   94.43
  9978.87
                 94.6210001.24
                                                                                          94.9810208.12
94.9810375.86
10104 68
                 94.6710138.22
                                                                  94.7610171.78
                                                                                                                  94 85
10233.28
                 95.1810269.63
                                         95.3410456.93
10392.64
                 95.2310437.36
                                                                  95.2410493.28
                                                                                          95.4810518.44
                                                                                                                    95.8
                                         96.3110593.92
97.1210784.03
                                                                 95.9510630.27
96.89 10800.8
                                                                                          96.1510647.04
97.3210842.74
                 95.8210579.95
10689.69
                 96.0510747.68
                                                                                                                  96.77
10907.04
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96.2411175.42
                                                                                         96.5211010.48
95.88 11195
                 96.6110943.38
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11081.17
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                                         95.8511345.96
95.6211465.47
                                                                  95.6 11385.1
95.1111490.62
                                                                                          95.611421.44
94.5811515.76
11259 29
                 96.2611290.05
                 95.2911458.29
11526.53
                 95.1211548.08
                                           94.511566.03
                                                                  95.5211583.99
                                                                                          93.1911601.95
                                                                                                                  91.52
                                         91.1711634.28
91.9312101.17
                                                                  90.8312008.54
                                                                                          90.83 12033.7
97.2512126.31
12053.27
                 91.6212083.22
                                                                  96.6612111.95
                                                                                                                   97.16
                 97.7612147.87
96.3712316.67
                                         97.3912181.87
96.5312370.54
                                                                 96.9412234.06
96.2912392.09
                                                                                          96.48 12259.2
96.912406.46
12137.09
12273.58
                                                                                                                  96.83
                 97.1912445.97
97.1112575.26
                                                                  96.412496.24
95.7112607.58
                                                                                          97.1312522.94
95.3312632.72
12420 83
                                         97.1112478.29
                                           95.3 12600.4
12650 68
                 96 0712668 65
                                         96 2812733 29
                                                                  96 2812740 47
                                                                                          96 4912783 57
                                                                                                                  95 77
                                          95.912844.45
96.713002.65
                                                                 96.1312902.09
96.4213017.02
                                                                                          96.0912916.45
96.9413042.16
                 96.1412991.88
12955.97
                                                                                                                  97.19
13096.04
13193.01
                 97.313106.81
96.0913214.56
                                         98.2313124.77
96.73 13239.7
                                                                  97.0813140.79
95.9513258.21
                                                                                          96.9513167.86
96.3913304.34
                                                                                                                  96.36
  13322.3
                                         96.2513383.36
96.2813509.06
                                                                 94.7713394.13
97.2713519.84
                                                                                          94.6413433.64
98.8113530.61
                 95.8413361.81
                 96.39 13494.7
                 97.4913557.34
95.8513694.33
13537 79
                                         95 6813588 08
                                                                  95 7313602 45
                                                                                          96 4913613 22
                                                                                                                    96 6
                                         95.6513716.69
13782.02
                 98.4813792.79
                                         99.4713807.16
                                                                  99.6313814.34
                                                                                          98.6613834.11
                                                                                                                  98.48
               98.6713870.46
101.4213954.41
 13850.89
                                        100.5513878.85
                                                                  99.8813895.62
                                                                                          99.9413911.32
                                                                100.1613983.15
                                                                                        100.27 14004.7
                                        101.1813968.78
                                                                                                                 101.28
13925.68
14021.42
14070.28
               101.5114029.81
106.9814081.22
                                       102.92 14038.2
107.814088.87
                                                                105.7414046.59
104.7114095.43
                                                                                         107.3314054.98
14127.14 102.21
Manning's n Values
Sta n Val Sta
0 .096 5097.72
                                       num=
                                      n Val Sta
.066 5117.38
                                                                  .015 5539.42
                                                                                           .066 6761.09
                                                                                                                    .085
Lengths: Left Channel
                                                                            Right
                                                                                           Coeff Contr.
                                                                                                                  Expan.
                                        1522.36 1400.85 1430.05
                                       T
28.67
           0 5097.72
Left Levee Station=
                                                          Elevation= 110.64
                                                     Elevation= 110.64
Elevation=107.9367
Right Levee Station= 20.07 Ele
Right Levee Station=14054.98 Ele
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R
982.21 5094.66 99.78 5535.2813815.26
```

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 152.81*

| INPUT | | | | | |
|------------------------|--------------------------------|--------------------------------|-------------------------------------|--------------------------------|----------------|
| Station E | lon: RGV-04,
Elevation Data | num= 455 | 71. 0. | 77. 01. | 71 |
| Sta | Elev Sta | Elev Sta | 110.08 41.32 | Elev Sta | Elev |
| 0 | 105.6 17.06 | 109.53 32.33 | | 107.42 57.03 | 101.68 |
| 74.99 | 98.18 88.66 | 99.21 142.66 | | 99.38 177.33 | 97.45 |
| 183.64 | 98.08 195.55 | 97.55 234.1 | | 97.8 381.31 | 97.96 |
| 426.87 | 97.88 450.7 | 98.39 666.6 | | 98.63 745.11 | 99.03 |
| 752.12 | 95.3 761.93 | 92.5 772.45 | | 94.2 815.21 | 94.04 |
| 875.1 | 94.22 953 | 94.27 969.44 | 94.44 1000.36 | 95.51 1017.2 | 95.63 |
| 1023.43 | 95.59 1059.84 | 95.47 1099.58 | | 95.71 1241.82 | 95.86 |
| 1285.65 | 95.59 1303.87 | 95.72 1340.29 | 95.66 1354.86 | 95.86 1402.2 | 95.97 |
| 1420.41 | 95.82 1460.48 | 95.89 1485.25 | 96.59 1769.73 | 96.36 1649.87 | 96.54 |
| 1657.15 | 96.43 1706.81 | 96.65 1725.96 | | 96.73 1808.02 | 96.65 |
| 1835.37 | 96.92 1840.84 | 96.73 1868.2 | | 94.01 1981.3 | 94.2 |
| 2010.42 | 94.14 2035.92 | 94.27 2152.47 | | 94.32 2250.8 | 94.5 |
| 2273.03 | 94.44 2294.91 | 95.73 2311.32 | | 96.23 2366.03 | 96.43 |
| 2448.09 | 96.32 2472.71 | 96.53 2494.59 | | 96.69 2562.98 | 96.5 |
| 2625.89 | 96.69 2673.28 | 96.72 2691.5 | 97.74 2698.78 | 97.66 2716.99 | 95.84 |
| 2762.66 | 95.92 2776.33 | 95.79 2811.89 | | 95.7 2833.77 | 96.25 |
| 2866.6 | 95.95 2918.57 | 95.99 2940.45 | 96.15 2954.13 | 95.95 2986.96 | 96.23 |
| 3036.19 | 96.17 3055.71 | 96.26 3090.9 | 96.36 3315.19 | 96.3 3170.22 | 96.17 |
| 3183.9 | 96.35 3216.72 | 96.19 3276.9 | | 96.25 3364.43 | 96.33 |
| 3372.64 | 96.54 3399.99 | 96.23 3476.58 | | 96.66 3591.47 | 96.57 |
| 3629.76 | 96.74 3720.02 | 96.56 3750.12 | | 96.62 3809.62 | 97.27 |
| 3824.19 | 97.21 3842.39 | 97.56 3933.38 | | 97.72 3980.79 | 97.45 |
| 4009.97 | 97.88 4024.5 | 97.62 4056.47 | | 97.71 4119.38 | 97.87 |
| 4151.96 | 97.59 4166.53 | 97.71 4182.3 | 97.42 4220.59 | 97.57 4246.67 | 97.82 |
| 4312.22 | 97.61 4366.85 | 97.99 4381.42 | | 99.61 4403.27 | 100.21 |
| 4425.13 | 98.21 4446.98 | 97.72 4461.55 | 97.77 4476.11 | 97.31 4487.04 | 97.55 |
| 4497.96
4644.53 | 98.57 4516.18
99.29 4655.97 | 98.44 4559.89
96.19 4673.94 | 93.31 4683.74 | 98.13 4636.37
92.74 4700.39 | |
| 4703.34 | 90.78 4722.94 | 85.9 4734.38 | 79.82 4739.36 | 78.07 4761.97 | 72.93 |
| 4768.59 | 72.03 4781.81 | 71.58 4793.91 | 67.84 4814.06 | 67.24 4844.06 | 67.24 |
| 4870.04 | 68.49 4896.02 | 68.96 4920.54 | | 1.40977 4931.66 | 73.02 |
| 4941.69 | 74.77 4954.23 | 80.7 4961.76 | | 87.45 4979.32 | 90.22 |
| 4989.35
5059.58 | 91.47 5019.45
97.44 5067.1 | | 92.62392 5039.52 | 94.15 5050.06
96.82 5156.86 | 96.21
96.59 |
| 5209.89 | 96.6 5246.34 | 96.42 5316.22 | 96.41 5364.82 | 96.14 5441.77 | 96 |
| 5462.04 | 95.88 5510.64 | 96.09 5537.98 | 94.93 5850.88 | 95.65 5641.27 | 95.39 |
| 5656.46 | 95.47 5723.29 | 95.29 5820.5 | | 95.28 5902.52 | 96.91 |
| 5929.86 | 97.15 6024.04 | 97.24 6081.76 | | 97.28 6221.5 | 97.43 |
| 6284.78 | 97.26 6327.72 | 97.35 6394.66 | | 97.25 6513.14 | 97.16 |
| 6586.05 | 97.23 6634.66 | 96.98 6671.11 | | 96.95 6810.86 | 97.07 |
| 6853.39 | 96.9 6911.1 | 96.89 6953.64 | | 96.89 7011.36 | 97.02 |
| 7049.74 | 96.81 7078.19 | 96.86 7172.37 | 96.62 7201.95 | 96.65 7256.58 | 96.48 |
| 7291.72 | 96.17 7330.74 | 95.02 7389.28 | | 94.61 7457.93 | 94.51 |
| 7525.88 | 94.47 7558.18 | 94.32 7618.94 | 94.29 7701.51 | 93.99 7709.32 | 94.2 |
| 7736.64 | 94.04 7756.15 | 93.1 7787.37 | 93.73 7908.36 | 92.42 7830.31 | 91.28 |
| 7842.02 | 91.37 7857.63 | 93.24 7896.65 | | 94.57 7927.87 | 96.76 |
| 7947.38 | 96.89 7966.91 | 96.57 8029.05 | | 96.31 8103.51 | 96.6 |
| 8115.21 | 96.15 8123.02 | 96.41 8142.53 | | 96.37 8177.91 | 96.13 |
| 8256.9 | 96.19 8275.12 | 95.97 8311.58 | | 96.5 8369.29 | 96.48 |
| 8393.59 | 97.71 8402.71 | 97.94 8417.9 | | 97.82 8466.51 | 97.88 |
| 8499.92 | 98.61 8518.15 | 98.72 8527.26 | 99.42 8554.61 | 100.23 8578.92 | 99.83 |
| 8603.06 | 99.11 8622.57 | 96.38 8630.56 | | 94.57 8673.09 | 94.37 |
| 8688.28 | 94.54 8697.4 | 94.2 8709.55 | 94.44 8727.77 | 94 8755.12 | 93.86 |
| 8815.88 | 93.93 8873.6 | 93.8 9022.46 | 94.11 9204.09 | 93.38 9102.63 | 93.48 |
| 9129.95 | 93.88 9149.46 | 94.86 9168.97 | | 94.47 9241.19 | 95.39 |
| 9258.74 | 95.07 9329.3 | 94.73 9374.86 | 94 9678.66 | 94.1 9485.1 | 94.19 |
| 9531.94 | 94.17 9602.18 | 93.98 9651.32 | | 94.32 9699.93 | 93.93 |
| 9715.12 | 94.14 9754.62 | 94.03 9781.96 | | 94.17 9818.41 | 94.31 |
| 9827.52 | 94.82 9839.67 | 94.86 9870.06 | | 94.29 9915.62 | 93.94 |
| 9936.89 | 94.18 9955.12 | 94 9967.26 | | 94.710028.03 | 94.45 |
| 10049.29 | 94.5810064.48 | 94.9410085.75 | | 94.8810140.43 | 94.65 |
| 10167.77
10292.33 | 95.32 10186
94.9810304.69 | 94.6510207.27
94.6310322.72 | 94.4210246.76 | | 94.78
95.19 |
| 10410.81 | 94.8810438.16 | 95.1910450.31
95.3210599.17 | | 95.4910501.95 | 95.41
95.28 |
| 10544.49 | 96.0810559.68
95.8110726.76 | 9710744.99 | 96.8610766.26 | 95.110666.01
96.3710784.49 | 96.98 |
| 10830.05 | 95.8510863.48 | 95.8710899.93 | | 96.2410966.76 | 95.4 |
| 10988.03 | 95.7811012.33 | 95.0711036.64 | | 96.4411094.36 | 96.25 |
| 11118.66 | 95.3911139.93 | 95.6411167.27 | | 94.911212.84 | 95.31 |
| 11246.26 | 95.411282.71 | 95.6611316.13 | | 94.7211419.43 | 95 |
| 11434.62 | 94.7211458.92 | 94.711477.14 | | 94.5711534.09 | 94.37 |
| 11573.11 | 94.5111596.53 | 93.911616.04 | | 93.2111655.06 | 92.38 |
| 11690.2 | 92.0412096.89 | 92.0412115.12 | 93.3312124.23 | 93.65 12145.5 | 93.61 |
| 12157.65 | 94.0212178.04 | 93.6112197.56 | | 97.3112285.24 | 96.19 |
| 12341.96 | 95.6712369.28 | 95.73 12384.9 | 95.4212467.53 | 95.112529.31 | 95.26 |
| 12544.92 | 95.5212572.23 | 95.5412607.36 | 94.6412762.21 | 95.9312681.51 | 95.68 |
| 12712.73 | 94.612740.05 | 94.8112747.86 | | 95.1612819.93 | 95.09 |
| 12892.26 | 95.3512939.09 | 94.912966.42 | | 94.8413005.25 | 95.22 |
| 13067.89 | 95.4513093.35 | 95.813126.43 | | 95.9813177.17 | 95.93 |
| 13193.6 | 96.3813263.47 | 97.0513278.64 | | 97.4213309.86 | 96.85 |
| 13327.27 | 96.813356.69 | 95.5613375.88 | | 95.4913434.76 | 95.03 |
| 13454.87 | 95.4413476.13 | 94.76 13505 | 94.813524.51 | 94.5413567.45 | 94.74 |
| 13590.87 | 9413602.58 | 93.94 13645.5 | | 94.7613727.47 | 95.25 |
| 13739.17 | 96.0313750.88 | 96.0213758.69 | 95.3613779.93 | 94.46 13801.2 | 96.33 |
| 13840.65 | 96.8913871.87 | 96.4313928.79 | 98.65 14059.2 | 95.9513974.37 | 96.14 |
| 14000.67 | 96.1214035.79 | 98.34 14051.4 | | 98.2914098.92 | 98.18 |
| 14108.03 | 98.7814120.19 | 100.42 14129.3 | 98.6314223.48 | 98.7514147.52 | 99.19 |
| 14164.58 | 98.2514180.19 | 98.914199.17 | | 99.414256.89 | 99.79 |
| 14284.23 | 100.7214293.34 | 102.5514302.46 | | 110.0314320.69 | 110.93 |
| 14338.19 | 110.1714351.31 | 109.01 14368.8 | | 110.6514377.55 | 109.43 |
| 14388.48 | 104.4914392.86 | 103.5514401.61 | | 99.4914465.02 | 99.49 |
| Manning's
Sta | s n Values
n Val Sta | num= 5
n Val Sta | n Val Sta | n Val Sta | n Val |
| 0 | .169 4636.37 | .066 4700.3 | | .066 5441.77 | .102 |
| Bank Sta: | Left Right 536.37 5067.1 | Lengths: Left
1522.36 | Channel Right
1400.85 1430.05 | Coeff Contr. | Expan .3 |
| Left Leve
Right Lev | ee Station= | 32.33 El | evation= 110.08
evation=110.9333 | | |
| | | num= 2
Sta L Sta R | | | |
| | 4636.37 100.08 | 5067.114465.02 | | | |
| CROSS SEC | CTION | | | | |

REACH: Lower Reach RS: 152.53

INPUT

Description: RGV-04, Updated on left with new survey to Station 1028.80.

Bathymetric elevations translated from IBWC 2008 Cross-sections

Station Elevation Data num= 449 Sta Elev 0 104.29 11 105.58 108.72 109.51 44 107.39 36 57.99 102.05 73.99 154.97 99.13 190.97 82.99 278.95 99.98 329.94 98.97 115.98 98.65 99.58 99.65 99.69 99.17 364.93 771.85 907.82 99.49 463.91 100.45 872.83 94.5 942.82 429.92 100.22 645.87 100.05 686.87 100.2 101.32 94.67 101.04 95.45 93.53 922.82 955.81 983.81 1028.8 93.71 1157.72 93.95 1279.07 1095.41 93.61 1115.09 93.48 1174.12 93.68 1206.92 93.9 1262.67 93.75 1315.15 93.75 1344.66 1220.04 94.07 94.42 1492.25 94.7 1689.03 95.31 1866.13 95.66 2072.75 95.92 2341.68 93.89 1426.65 94.69 1607.04 94.1 1485.69 94.55 1669.35 94.29 1538.16 94.88 1757.9 95.18 1879.25 95.45 2148.18 95.98 2364.64 95.2 1810.37 95.44 1984.19 95.73 2272.81 95.12 1833.33 95.38 2026.83 96.1 2302.32 1784.14 95.32 2217.05 96.25 96.3 2423.67 94.91 2541.74 97.79 2430.23 95.07 2587.65 97.68 2446.63 94.98 2663.09 95.01 2463.03 95.08 2705.72 2407.27 2489.26 95.08 2705.72 95.46 2905.78 96.02 3276.38 96.37 3430.53 97.31 3558.43 97.59 3712.58 97.74 3883.12 99.24 3951.99 97.58 4017.59 2718.84 2938.58 95.19 2751.64 95.72 3023.85 95.39 2771.31 95.68 3161.59 95.28 2817.23 96.04 3250.15 95 5 96.18 3404.29 97.3 3515.8 97.62 3624.03 97.56 3765.05 97.68 3932.31 95.97 3364.93 3319.02 96.19 3417.41 97.23 3597.79 97.37 3751.93 97.8 3912.64 97.34 3630.59 3584.67 97.62 3738.81 97.31 3824.09 98.06 3945.43 3965.11 101.3 3978.23 99 3984 79 98.31 4004.47 96.91 4040.54 97.98 4155.33 4030.7 97.23 4050.38 98.74 4066.78 98.5 4106.14 100.31 4188.13 73.41 4247.16 97.53 4168.45 84.94 4237.32 99.87 4175.01 74.63 4240.6 4145.49 97.02 67.44 4343.16 72.93 4430.81 94.88 4493.13 97.27 4594.79 95.9 4788.32 66.64 4323.16 68.64 4417.7 91.62 4480.01 67.34 4263.16 66.64 4303.16 4253.16 68.04 68.44 4383.16 82.82 4457.05 92.74 4558.72 68.64 4403.16 86.66 4466.89 95.46 93.55 4575.12 96.07 4670.24 96.1 4584.95 95.96 4748.96 4532.48 97 55 4621.03 95.85 4640.71 95.54 4916.25 95.22 4932.65 95.26 5021.22 94.81 5073.7 95.11 94.51 5214.75 93.66 5441.08 97.18 5690.37 97.33 5969.19 94.81 5073.7 94.33 5303.31 96.6 5526.36 97.44 5775.66 97.03 6074.16 93.81 5408.28 97.17 5628.05 97.53 5883.9 94.2 5496.84 97.41 5749.42 97.28 6028.23 5355.79 96.99 5591.97 5841.26 97.13 6156.16 6477.62 97.03 6234.88 97 6523.54 97.12 6287.37 96.78 6559.62 96.84 6326.73 96.93 6585.86 97.1 6415.29 96.82 6631.79 96.72 6694.11 96.75 6822.04 96.23 7022.13 6661.31 96.94 6730.19 96.71 6766.27 96.6 96.74 6867.96 96.47 6966.37 96.42 6972.93 96.23 7022.13 95.99 7284.54 95.67 7553.52 95.11 7806.09 94.86 7983.22 94.84 8130.83 99.76 8252.2 100.16 8340.77 99.7 8442.45 96.09 7176.3 95.79 7425.59 95.34 7694.57 7077.89 96.16 7166.46 95.95 7225.5 95.76 95.16 7166.46 95.9 7396.07 95.64 7665.04 94.9 7911.06 94.94 8058.67 95.58 7478.07 95.44 7792.97 7592.88 95.24 95.23 7924.18 94.75 8078.35 7891.38 94.97 7953.7 94.98 8098.03 97.72 8212.83 8038.99 95.5 8160 35 95.56 8186.59 97.37 8196.43 99.16 8321.08 100.59 8396.53 99.2 8330.92 100.08 8419.49 101.21 8386.69 8360.45 97.74 96.74 8504.78 95.97 8642.55 97.62 8471.98 96.94 8488.38 96.99 8514.62 8527.74 96.84 8547.42 96.18 8576.95 95.88 8750.8 96.08 8668.79 95.9 8685.19 96.11 8704.88 95.25 8941.06 95.88 8750.8 95.22 8980.42 95.82 8816.41 94.9 9009.94 95.61 8865.61 95.07 9042.74 8898.41 94.81 94.91 9114.91 93.3 9255.96 94.64 9147.71 93.4 9521.66 93.7 9656.16 9062.43 95.03 9088.67 94.69 9101.79 94.52 9196.92 93.47 9574.15 94.52 9246.12 93.4 9613.51 9544.63 94.01 9597.11 93.52 94.08 9702.08 93.36 9803.77 93.73 9725.04 93.96 9830.01 93.95 9734.88 93.45 9852.97 94.72 9748 93.83 9872.65 9780.81 93.56 94.6 9951.38 94.7810072.75 95.4510223.64 94.7810341.73 95.18 10463.1 94.23 9974.34 94.4510102.27 94.41 9990.74 95.4710121.95 9885.77 94.33 9934.98 10013.71 94.210030.11 94.46 94.0710187.56 94.1310289.25 94.5710236.76 95.0310364.69 94.8810249.88 94.5310394.22 10144 92 95.8510525.43 95.24 10679.6 95.8510768.17 10407.34 94.510436.86 95.0210509.03 94.69 95.110587.75 96.4610705.84 94.4910653.36 96.6710748.49 94.2910640.24 10686.16 96.8910725.52 96.65 9510892.82 95.0411014.19 94.7610905.94 9411040.43 95.210935.46 94.611076.51 10817.37 94.9410853.46 10964.98 94.5110987.95 96.24 95.85 11129 94.5611266.77 94.6711151.96 94.6511306.13 95.0111181.48 95.0611342.22 94.8511207.72 93.9611407.82 11102.76 11453 75 94 4111470 15 94.0511496.39 94 1711516 07 94 7711535 75 93 99 94.2511647.28 95.6612237.73 95.7612306.62 95.0412483.75 93.9112204.93 95.3412280.37 96.9612388.62 93.8412614.96 93.2412185.25 93.2412195.09 96.2212263.97 12214.77 95.23 95.71 12326.3 94.6312516.55 96.69 12342.7 94.1812585.44 12290.21 12424.71 12634.64 12788.82 93.9112710.09 94.2412821.62 93.9912739.61 94.2612838.02 94.3312762.57 93.912887.22 93.5212674.01 94.24 94.6312798.66 93.9512998.75 94.3113195.57 95.2813369.42 12903 63 94 412913 47 94 0412942 99 94 2612965 95 94 28 93.8513139.81 95.3213313.66 95.1913343.18 13248.05 94.8913261.18 95.8 96.0313428.47 95.3713566.24 96.6913444.87 94.0613576.08 96.7913474.39 94.4413615.45 96.613513.76 94.113635.13 13536.72 13651.53 94.4913674.49 97.2614114.05 93.2414002.52 96.9414163.25 93.2414015.64 97.0314189.49 95.6414025.48 96.5214212.46 97.1214268.22 97.6914356.79 97.7814399.43 96.7314251.82 98.1514346.95 96.9314310.86 98.2814363.35 14245.26 98.114327.26 97 83 97.5914428.95 14379.75 98.2914389.59 98.4314405.99 96.5 96.6214481.44 95.9314468.32 98.3414491.28 98.8414517.52 108.5714576.57 112.7314586.41 14547.04 99.9414556.88 102.1914566.72 113.93 14599.53 113.0814612.65 113.5114671.69 112.7814632.33 111.6814688.09 111.0514642.17 104.2614694.66 111.3314658.57 102.85 14704.5 14665.13 14707.78 101.8414717.62 97.24 14720.9 96.76 14802.9 96.76 Manning's n Values ing's n Values num= 5
Sta n Val Sta n Val Sta
0 .169 4175.01 .066 4237.32 n Val Sta .015 4430.81 n Val Sta Lengths: Left Channel Right 1576.77 1533.33 1581.16 Bank Sta: Left Right Coeff Contr. Expan. 4175.01 4594.79 Station= Elevation= 109.51 Station=14586.41 Right Levee Elevation= 113.93 Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R

9.01 3966.2 101.43 4597.1814224.23 96.85

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 105.21 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|-----------|-----------|-----------|
| Vel Head (ft) | 0.08 | Wt. n-Val. | 0.169 | 0.061 | 0.102 |
| W.S. Elev (ft) | 105.13 | Reach Len. (ft) | 1576.77 | 1533.33 | 1581.16 |
| Crit W.S. (ft) | 91.80 | Flow Area (sq ft) | 15464.73 | 10154.97 | 74815.31 |
| E.G. Slope (ft/ft) | 0.000367 | Area (sq ft) | 15876.20 | 10154.97 | 81137.45 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 6283.01 | 38703.29 | 80013.70 |
| Top Width (ft) | 14511.48 | Top Width (ft) | 4125.08 | 419.78 | 9966.62 |
| Vel Total (ft/s) | 1.24 | Avg. Vel. (ft/s) | 0.41 | 3.81 | 1.07 |
| Max Chl Dpth (ft) | 38.49 | Hydr. Depth (ft) | 3.75 | 24.19 | 7.51 |
| Conv. Total (cfs) | 6526647.0 | Conv. (cfs) | 328055.7 | 2020822.0 | 4177769.0 |
| Length Wtd. (ft) | 1558.20 | Wetted Per. (ft) | 4126.65 | 433.16 | 9969.02 |
| Min Ch El (ft) | 66.64 | Shear (lb/sq ft) | 0.09 | 0.54 | 0.17 |
| Alpha | 3.38 | Stream Power (lb/ft s) | 0.03 | 2.05 | 0.18 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 117216.10 | 45333.61 | 149253.20 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 16653.75 | 2055.66 | 18589.16 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande RS: 152.25* REACH: Lower Reach

| INPUT | | |
|-----------|----------|-------|
| Descripti | on: RGV- | 04, |
| Station E | levation | Data |
| Sta | Elev | St |
| 0 | 102.61 | 6.4 |
| 72.95 | 101.56 | 89.6 |
| 303.06 | 99.16 | 392.5 |

| Descripti | | | | 451 | | | | | |
|----------------------|----------------|----------------------|---------------|----------------------|----------------|----------------------|--------|--------------------|----------------|
| Station E
Sta | Elev | Sta | num=
Elev | 451
Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 102.61 | | 104.23 | 16.03 | 104.67 | 39.1 | 109.06 | 50 | 109.27 |
| 72.95 | 101.56 | 89.66 | 98.4 | 99.03 | 99.2 | 173.97 | 98.88 | 211.46 | 99.14 |
| 303.06 | 99.16 | 392.59 | 99.13 | 460.26 | 98.99 | 495.65 | 99.44 | 650.24 | 99.39 |
| 663.2 | 99.65 | 714.17 | 99.69 | 746.6 | 99.39 | 779.95 | 99.44 | 813.31 | 95.98 |
| 889.15
967.85 | 95.71
91.59 | 921.42
981.19 | 96.2
91.71 | 932.87
989.85 | 96 | 943.29
1008.51 | 92.25 | 957.85
1038.51 | 89.42
91.01 |
| 1051.3 | | 1062.88 | | 1066.74 | 93.59 | 1082.74 | | 1110.47 | 93.87 |
| 1124.67 | 94.02 | 1150.8 | 93.73 | 1191.13 | 93.98 | 1203.74 | 93.52 | 1218.87 | 94.06 |
| 1228.95 | 93.76 | 1279.37 | 93.63 | 1307.1 | 94.24 | 1347.43 | 93.51 | 1418.02 | 93.53 |
| 1430.62 | 93.97 | 1460.87 | 93.62 | 1478.52 | 93.95 | 1496.17 | 93.59 | 1564.89 | 93.54 |
| 1599.63 | | 1607.36 | 93.61 | 1723.04 | 93.96 | 1778.51 | | 1806.23 | 94.09 |
| 1821.36
1912.11 | | 1844.05
1919.68 | | 1866.74
1939.85 | 95.19 | 1889.42
1960.01 | | 1902.03
1972.61 | 96.54
95.58 |
| 2002.86 | | 2048.24 | | 2081.01 | | 2101.18 | | 2147.97 | 95.27 |
| 2254.96 | | 2315.46 | | 2328.07 | | 2363.35 | | 2386.05 | 96.14 |
| 2451.59 | 95.92 | 2496.97 | 96.1 | 2595.28 | 96.01 | 2607.89 | 96.32 | 2633.09 | 96.25 |
| 2653.26 | 95.17 | 2698.64 | 94.99 | | 94.98 | 2800.58 | 95.15 | | 95.17 |
| 2857.46 | 96.03 | 2877.8 | | 2897.11 | 94.36 | | 94.47 | | 94.39 |
| 2968.38
3127.2 | | 2988.54
3217.62 | | 3018.79
3256.24 | | 3071.73
3296.09 | | 3114.59
3389.37 | 95.08
95.72 |
| 3454.9 | | 3467.51 | | 3475.07 | | 3495.24 | | 3535.57 | 94.75 |
| 3738.92 | | 3775.06 | | 3893.54 | | 3903.62 | | 3978.34 | 95.29 |
| 4024.68 | | 4055.57 | | 4097.73 | | 4206.17 | | 4237.06 | 96.02 |
| 4252.51 | 96.3 | 4283.41 | 96.16 | 4291.13 | 96.34 | 4329.65 | 96.46 | 4359.9 | 97.41 |
| 4448.13 | 97.1 | 4463.26 | | 4473.34 | 96.95 | 4503.59 | 96.68 | 4518.71 | 97.09 |
| 4541.41 | | 4561.57 | 96.37 | | 96.47 | 4611.98 | | 4646.38 | 97.19 |
| 4661.83
4740.55 | | 4669.55
4762.23 | 98.58 | 4685
4773.81 | | 4700.45
4788.45 | | 4712.83
4813.66 | 97.1
97.18 |
| 4833.83 | | 4848.95 | | 4881.72 | | 4908.97 | | 4924.42 | 97.42 |
| 4932.14 | | 4964.62 | | 4972.74 | | 4982.49 | | 5001.688 | |
| 5016.59 | | 5026.34 | | 5034.46 | | 5047.67 | 75.19 | 5059.29 | 72.41 |
| 5065.99 | | 5079.38 | | 5091.62 | | 5112.03 | | 5137.76 | 66.54 |
| 5180 | 67.83 | | | | 69.53 | | 72.9 | | 74.4 |
| 5261.03
5341.86 | 83.5
91.5 | 5268.86
5362.71 | 87.58 | 5279.29
5370.53 | 90.68 | 5289.72
5394.55 | 91.75 | 5321
5430.93 | 90.49 |
| 5438.98 | 95.27 | 5459.1 | | 5511.62 | 95 12 | 5547.64 | | 5616.68 | 94.72 |
| 5748.99 | | 5777.18 | | 5801.33 | | 5877.83 | | 5937.87 | 92.49 |
| 5952.88 | | 6018.91 | | 6066.94 | | 6095.25 | | 6114.97 | 92.86 |
| 6151.61 | | 6196.02 | | 6223.03 | | 6280.45 | | 6320.71 | 96.79 |
| 6373.05 | | 6413.31 | | 6451.17 | 96.66 | 6511.2 | | 6550.22 | 96.52 |
| 6628.27
6919.44 | 96.44
96 | 6682.3
6955.46 | 96.24 | 6724.33
7021.28 | 96.27
95.82 | 6832.04
7033.36 | 95.17 | 6871.41
7057.51 | 96.25
95.77 |
| 7069.59 | 94.91 | 7129.98 | 94.55 | 7150.12 | 94.95 | 7210.51 | 94.87 | | 95.05 |
| 7261.64 | | 7291.66 | | 7324.68 | | 7423.74 | | 7476.24 | 94.54 |
| 7516.49 | | 7546.81 | 94.46 | 7591.83 | | 7637.28 | | 7661.44 | 94.15 |
| 7732.92 | | 7806.38 | | 7874.83 | | 7943.28 | | 7961.05 | 93.8 |
| 7999.64 | | 8078.12 | | 8114.14 | | 8180.17 | 93.23 | 8207.2 | 93.3 |
| 8297.24
8471.34 | | 8309.25
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8576.41 | | 8405.31
8606.43 | | 8444.33
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| 8666.46 | | 8681.46 | | 8717.49 | 94.91 | 8729.5 | | 8762.52 | 93.38 |
| 8780.53 | | 8816.55 | | 8849.57 | | 8870.58 | | 8891.59 | 94.83 |
| 8933.63 | 94.16 | 8948.63 | 94.33 | 8957.64 | | 8969.64 | | 8987.65 | 93.79 |
| 9014.68 | | 9074.71 | | 9233.81 | | 9278.84 | | 9308.85 | 93.17 |
| 9347.88 | 93.15 | 9383.9 | | 9410.92 | | 9440.93 | | 9458.95 | 93.02 |
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92.14 |
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| 10257.44 | | 10272.44 | | 10308.46 | | 10329.48 | | 10344.49 | 94.63 |
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| 10521.59 | | 10533.6 | | 10563.62 | | 10581.63 | | 10629.66 | 94.69 |
| 10650.67 | | 10677.69 | | 10689.7
10836.79 | | 10716.71 | | 10740.73 | 94.74
94.25 |
| 10782.76
10914.84 | | L0797.77
L0962.86 | | 10836.79 | | 10854.8 | | 11019.9 | 94.25 |
| 11064.93 | | 11097.95 | | 11133.97 | | 11172.99 | | 11200.01 | 93.96 |
| 11221.03 | | 11245.04 | | 11269.05 | | 11302.07 | | 11326.09 | 94.82 |
| 11350.1 | | 11371.11 | | 11398.13 | | 11422.14 | | 11443.16 | 93.75 |
| 11476.18 | | 11512.2 | | 11545.22 | | 11605.26 | | 11647.29 | 93.65 |
| 11662.3 | | 11686.31 | | 11704.32 | | 11722.33 | | 12050 | 93.54 |
| 11824.39
12086.23 | | L1909.09
L2134.56 | | 11933.24
12178.84 | | 12001.69
12211.05 | 93.31 | 12050
12316.7 | 93.14
92.87 |
| 12343.71 | | L2134.56
L2364.72 | | 12178.84 | | 12388.73 | | 12316.7 | 94.87 |
| 12427.76 | | 12445.77 | | 12460.78 | | 12496.91 | | 12521.07 | 94.75 |
| 12541.21 | 94.31 | L2577.44 | 95.693 | 12625.75 | 95.041 | 12653.94 | 94.52 | 12682.12 | 94.42 |
| 12710.31 | | 12718.35 | | 12727.94 | | 12763.97 | | 12796.99 | 93.37 |
| 12824 | 93.61 | 12845.01 | 93.541 | 12869.03 | 93.81 | 12878.04 | 93.54 | 12914.06 | 93.31 |

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14658.37
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Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .169 4932.14 .066 5001.68 .015 5268.86
                                                                                       n Val Sta .066 5370.53
                                      Lengths: Left Channel Right
1576.77 1533.33 1581.16
50 Elevation= 109.27
4514.04 Elevation=111.1033
Bank Sta: Left Right 4932.14 5370.53
                                                                                        Coeff Contr.
                                                                                                               Expan.
Left Levee
Right Levee
                       Station= 50
Station=14514.04
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R
775 4929.43 97.71 5379.23 14246.7
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                      RS: 151.98*
INPUT
Description: RGV-04,
Station Elevation Data
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                                                      Sta
       Sta
                              Sta
                                      103.62
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                                                                          31.18
                                                                                     104.32
                                                                                                   41.03
   135.19
608.14
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                                                                 98.7
                                                                          490.59
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                                                                                                  527.38
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906.75
                                                                                       99.22
91.12
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                                                                91.91
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                                        98.76
                                                  857.62
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                                        87.6 1012.89
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96.44 1196.98
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95.63 1079.98
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97.17 1126.39
   992.74
                                                                                        88.36 1048.21
                                                                                                                88 39
 1071.28
                97.05 1175.7
93.87 1274.33
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                                                                                                               94.33
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75.63 5863.71
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72.16 5871.19
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70.43 6041.8 72.86 6049.54
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                94 29 11105 5
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Manning's n Values
                                   n Val Sta
.066 5863.71
                                                                               n Val
      Sta n Val
                            Sta
                                                         n Val
                                                                                                    n Val
                   .1 5689.27
                                                          .015 6070.82
                                                                                 .066 6146.28
                                                                                                      .082
                                   Lengths: Left Channel Right
1576.77 1533.33 1581.16
63.99 Elevation= 109.03
Bank Sta: Left Right 5689.27 6146.28
                                                                                 Coeff Contr.
Left Levee
                 Station= 63.99
Station=14441.67
                                                   Elevation=108.2767
Blocked Obstructions num=
Sta L Sta R Elev Sta L
                                              Sta R
       a L Sta R Elev Sta L Sta R
754 5691.34 95.13 6150.3214044.75
                                                          Elev
RIVER: Rio Grande
                                   RS: 151.7
TNPIIT
Description: RGV-04, Updated on left with new survey to Station 1057.92.

Extended block obstruction, Bathymetric elevations translated from
                 IBWC 2008 Cross-sections
Station Elevation Data
                                  num=
                                               450
                                  Elev
103.02
                Elev
                                                       103.42
         0
               99.24
                                                                             102.43
                             10
                                                                        25
                                                   20
                                                                                              38
                                                                                                     102.4
             104.88 60.99
97.91 151.99
                                               77 99
        50
                                   108.88
                                                        108.79
                                                                    92.99
                                                                              103.26
                                                                                       108.99
                                                                                                     98.94
                                    99.13
                                                          98.44
                                                                  275.98
                                             192.98
                                                                                        434.97
  482.96
                98.1
                       555.96
                                    97.88
                                             642 95
                                                          97.93
                                                                   701.95
                                                                               98.25
                                                                                        725.95
                                                                                                     98.01
                                    98.77
                                             817.94
                                                                   829.94
                                                         86.53 1007.92
93.1 1177.74
94.97 1263.04
  865.93
               98.09
                       901.93
                                    87.84
                                             952.93
                                                                               86.02 1057.92
                                                                                                     85.78
 1233.51
                                    94.18 1249.91
                                                                               94.85 1272.88
               94.32 1243.35
                                                                                                     95.58
                94.6 1315.53
94.2 1404.1
                                    94.48 1318.81
93.87 1413.94
                                                          94.14 1331.93
94.33 1427.07
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94.17 1436.91
     1286
                                                                                                     94 02
 1390.98
 1453 31
               94.42 1472.99
                                    94 07 1499 24
                                                          94 53 1525 48
                                                                               94 11 1548 45
                                                                                                     94 49
                                                          93.44 1614.06
               94.29 1659.99
                                                                               93.69 1705.92
 1650.15
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                                                          94.17 1692.79
                                                                                                     94.86
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93.87 1840.42
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93.2 1873.23
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 1781.37
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 1889.63
1974.93
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92.88 1994.61
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93.26
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94.79 2398.13
 2211 13
               93 08 2227 53
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2736.03
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3379.04
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               96.88 3392.16
                                    96.41 3405.28
                                                                               93.08 3503.7
92.93 3736.63
 3454.49
               97.21 3467.61
                                    96.32 3480.74
                                                          93.74 3497.14
                                                                                                     93.41
                                                          92.98 3723.5
93.02 3825.2
94.79 3917.06
                       3572.6
 3539.79
                                    93.21 3602.12
               92.83
                                                                                                     94.23
                                    93.5 3769.43
94.65 3903.94
94.7 4081.09
                                                                               93.07 3851.45
94 3956.43
94.76 4110.62
 3746 47
               94.46 3756.31
                                                                                                     92 89
                93.3 3890.82
                                                                  4097.5
4317.3
 3972 83
               95.06 4025.32
                                                          95 16
                                                                                                     94 91
               95.14 4248.4
95.69 4438.68
                                    95.99 4281.21
96.19 4494.45
                                                                               95.83 4379.63
95.78 4523.97
                                                          95.65 4501.01
 4412.43
                                                                                                     94.98
              92.57 4550.22
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                                    93.32 4566.62
93.19 4852.03
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93.14 4871.72
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 4540.38
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              93.42 5058.71
93.33 5212.9
93.62 5531.11
97 5714.83
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93.47 5360.52
                                                                               93.19 5140.72
 5045.59
                                    93.22 5094.8
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                                                                                                     93.35
                                    93.56 5649.22
96.7 5806.68
95.94 5875.58
 5445 82
                                                          93.96 5662.34
                                                                               94 18
                                                                                        5685 3
                                                                                                     95 42
                                                                               96.63 5829.65
               98.54 5849.33
                                                          95.43 5882.14
 5836.21
                                                                               95.74 5888.7
                                                                                                     94.76
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94.27 6029.76
                                    95.96 5964.15
95.68 6042.89
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  6006.8
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 6118.34
6197.07
                94.7 6128.18
                                    95.13 6138.02
94.71 6226.6
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                                                                               94.98 6183.95
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                                                          94.45 6305.33
92.74 6393.91
 6259 41
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                                                                               94.74 6318.46
                                                                                                     94 13
                        6361.1
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               92.58 6466.08
  6446.4
                                                          90.73 6495.61
                                                                               89.26 6512.01
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 6521.85
6587.46
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83.77 6610.43
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83.7 6623.55
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               82.23 6603.87
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               87.72 6636.67
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69.14 6689.76
66.94 6789.76
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72.73 6679.76
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                                                                               73.47 6876.11
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 6882.67
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                                                          86.42 6915.46
95.51 6977.77
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93.55 7056.47
                                    95 6971.21
93.23 7141.73
                                                                               93.13 7164.69
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 7204.04
              92.63 7210.6
89.46 7279.46
                                    92.94 7230.27
89.04 7505.73
                                                          92.43 7253.23
89.04 7512.29
                                                                               92.52 7259.78
89.27 7525.41
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95.67 7817.27
 7548.36
               94.54
                       7558.2
                                    95.37 7607.39
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7738.56

94 66 8066 49

90.91 8335.39

91.37 8460.01

90.71 8669.88

89.3 8876.48

94 43 8079 61

89.94 8355.07

91.28 8499.36 91.01 8705.96

89.07 8905.99

94 63 8112 4

90.04 8371.47

91.8 8519.04 90.87 8768.26

89.5 8928.95

94 37

91.15

91.63

90.29

91.1

94 83 7994 35

93.6 8305.88

90.88 8443.61 91.72 8637.09

90.16 8824.01

7902 53

8296.04

8420.66 8574.78

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11683.56
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                                        92.7511821.29
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                                                                                        92.13 12247.6
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12267.27
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93.0713674.09
                                                                92.1313280.57
92.1313411.75
12900.18
                94.5412906.73
                                        92.2212910.01
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13444.54
                    9313460.94
                                        92.1313657.69
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                                                                                                                97.41
               96.8913697.04
13680.65
                                        93.2713710.16
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                                                                                        92.4913752.79
                                                                                                                93 69
13762.63
                93.4813779.03
                                        92.1813795.42
                                                                92.3213801.98
                                                                                        94.1813811.82
                                                                                                                  98.3
13828.22
                97.5413857.73
98.68 13988.9
                                        97.9813864.29
99.1314028.25
                                                                97.6113880.69
99.4114051.21
                                                                                        98.4713900.36
                                                                                                              99.01
100.95
14070.88 100.5314077.44
14129.91 101.8414133.19
                                      98.64 14084
101.4414139.75
                                                                                      101.0114113.52
                                                                98.2414103.68
                                                                                                              100.96
14339.79
               98.2514346.35 103.5414349.62 104.5314366.02
                                                                                        104.6 14369.3 105.45
Manning's n Values
                                      num=
    Sta n Val Sta n Val Sta 0 .1 6521.85
                                                               n Val Sta
                                                                                       n Val Sta
.015 6862.99
 6922.02 .082

        Bank Sta:
        Left 6446.4
        Right 64922.02
        Lengths:
        Left Channel 1235
        Right 1146.92
        Coeff Control

        Left Levee
        Station= 60.99
        Elevation= 108.88
        105.45

        Right Levee
        Station= 14369.3
        Elevation= 105.45

        Blocked Obstructions
        num= 3

        Sta L
        Sta
        Elev

        18.03
        766.2
        99.11
        839.84
        5705.92
        96.75
        6949.8613935.77
        96.05

                                                                                         Coeff Contr.
                                                                                                               Expan.
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                       104.49
                                                        Element
                                                                                              Left OB
                                                                                                                Channel
                                                                                                                               Right OB
                                                        Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   Vel Head (ft)
                                                                                                 0.100
                                                                                                                 0.056
                                                                                                                               1164.92
                                       104.45
                                                                                              1340.35
                                                                                                              1235.00
   W.S. Elev (ft)
   Crit W.S. (ft)
   E.G. Slope (ft/ft)
Q Total (cfs)
                                 0.000157
                                                                                             47585.78
                                                                                                             12187.49
                                                                                                                              61134.18
                                       125000.00
                                                                                                              34686.01
                                  14259.58
                                                                                                                475.62
                                                                                              6356.63
                                                                                                                                7427.33
```

Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft) Q Total (cfs) Top Width (ft) Vel Total (ft/s) Max Chl Dpth (ft) 0.71 1.03 2 85 0.92 38.11 25.62 Conv. Total (cfs) Length Wtd. (ft) 2704522.0 2772254.0 9990536.0 4513760 0 488.01 0.07 0.24 Shear (lb/sq ft) Stream Power (lb/ft s) 0.08 Min Ch El (ft) 66.34 Alpha Frctn Loss (ft) 113237.00 44173.61 141693.30 0.17 Cum Volume (acre-ft) 17642.11 C & E Loss (ft) Cum SA (acres) 16084.70 2008.38

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 151.49

Description: RGV-04, Updated on left with new survey to Station1013.88.

Bathymetric elevations translated from IBWC 2008 Cross-sections ation Data num= 465

| | | | elevation | ons trans | lated fi | rom IBWC | 2008 Cr | oss-secti | ons |
|--------------------|--------|---------|-----------|-----------|----------|--------------------|---------|--------------------|----------------|
| Station E | | | num= | 465 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | | Elev | Sta | Elev |
| 0 | 103.1 | 5 | 103.99 | | 108.44 | | 108.59 | 35 | 108.28 |
| 42 | 105.48 | 67 | 97.55 | 80.99 | 95.28 | 90.99 | 94.49 | | 95.54 |
| 105.99 | 97.25 | 123.99 | 97.53 | 129.99 | 96.6 | 169.98 | 96.75 | 243.97 | 96.61 |
| 277.97 | 96.94 | 337.96 | 96.8 | 404.95 | 96.94 | 451.95 | 96.9 | 486.94 | 96.98 |
| 607.93 | 97.09 | 648.92 | 96.88 | 701.92 | 96.92 | 768.91 | 96.89 | 809.9 | 97.32 |
| 863.9 | 97.27 | 890.89 | 97.16 | 949.89 | 97.2 | 970.88 | 97.28 | 1013.88 | 97.27 |
| 1059.61 | 96.87 | 1102.26 | | 1135.06 | 96.94 | 1190.83 | 97.28 | 1246.6 | 96.91 |
| 1285.97 | | 1299.09 | | 1351.58 | | | | 1417.19 | 97.12 |
| 1433.59 | | 1459.84 | | 1515.61 | | | | 1646.83 | 97.25 |
| 1666.51 | | 1709.16 | | 1741.96 | | 1850.22 | | 1886.31 | 97.1 |
| 1928.95 | | 1978.16 | | 2030.65 | | 2050.33 | 97.03 | | 97.26 |
| 2112.66 | | 2197.96 | | 2339.02 | | | | 2417.75 | 97.19 |
| 2473.52 | | 2506.32 | | 2522.72 | | 2545.69 | | 2555.53 | 98.58 |
| 2571.93 | 98.8 | | | 2621.14 | | 2680.19 | | 2703.15 | 98.69 |
| 2716.27 | | 2739.24 | | 2768.76 | | 2831.09 | | 2837.65 | 98.84 |
| 2850.77 | | 2860.62 | | 2893.42 | | 2939.35 | | 2955.75 | 98.79 |
| 2962.31 | | 2995.12 | | 3027.92 | | 3070.57 | | 3083.69 | 98.36 |
| 3109.93 | | 3152.58 | | 3185.39 | | 3231.31 | | 3247.71 | 98.51 |
| 3109.93 | | 3336.29 | | 3365.81 | | 3392.06 | | 3444.54 | 98.51 |
| | | 3506.87 | | 3523.28 | | 3542.96 | | 3556.08 | 98.5 |
| 3480.63
3592.17 | | | | | | | | | |
| | | 3634.81 | | 3661.06 | | 3746.35
3854.61 | | 3759.47
3903.81 | 98.82
98.27 |
| 3769.31 | | 3795.56 | | 3844.76 | | | | | |
| 3936.62 | | 3953.02 | | 3975.98 | | 4058 | | 4107.2 | 98.58 |
| 4130.17 | | 4136.73 | | 4179.37 | | 4199.06 | | 4218.74 | 98.65 |
| 4231.86 | | 4241.7 | | 4274.51 | | | | 4304.03 | 95.38 |
| 4330.28 | | 4343.4 | | 4395.89 | | 4415.57 | | 4448.37 | 95.58 |
| | | | | 4641.92 | | | | 4700.97 | 96.44 |
| 4717.37 | | 4733.77 | | 4753.46 | | 4786.26 | | 4819.07 | 89.26 |
| 4871.55 | | 4992.93 | | 5035.58 | | 5097.91 | | 5137.27 | 89.45 |
| 5150.39 | | 5209.44 | | 5268.49 | | 5294.73 | | 5347.22 | 89.62 |
| 5363.62 | | 5455.48 | | 5504.68 | | 5563.73 | | 5609.66 | 90.1 |
| 5635.9 | | 5655.58 | | 5665.43 | | | | 5691.67 | 92.11 |
| 5783.52 | | 5809.77 | 92.49 | 5826.17 | 92.69 | 5849.13 | 92.54 | 5865.53 | 92.73 |
| 5888.5 | | 5940.98 | 92.82 | 5980.35 | 92.63 | | | 6065.64 | 92.9 |
| 6131.25 | | 6154.22 | | 6206.7 | | 6229.67 | | 6239.48 | 93.88 |
| 6252.49 | 93.94 | 6278.51 | | | | 6311.03 | 97.23 | 6324.04 | 96.92 |
| 6333.8 | 97.49 | 6350.06 | | 6356.57 | | 6366.32 | | 6379.33 | 95.17 |
| 6385.84 | 95.03 | 6402.1 | 96.16 | 6411.86 | 94.79 | 6431.37 | 88.93 | 6437.88 | 87.99 |
| 6447.64 | 87.62 | 6457.39 | 88.02 | 6463.9 | 87.51 | 6480.16 | 87.87 | 6496.42 | 87.68 |
| 6522.44 | 89.24 | 6535.45 | 90.43 | 6554.97 | 90.42 | 6567.98 | 90.96 | 6577.77 | 90.73 |
| 6590.83 | 89.41 | 6603.88 | 91.05 | 6613.68 | 93.94 | 6623.47 | 95.3 | 6633.26 | 94.13 |
| 6652.85 | 85.44 | 6656.12 | 84.36 | 6678.97 | 73.04 | 6682.23 | 72.25 | 6690.23 | 57.26 |
| 6696.23 | | 6710.23 | | 6723.73 | | 6736.23 | | 6747.23 | 58.24 |
| 6752.23 | | 6758.23 | | 6771.23 | | 6781.23 | | 6855.24 | 72.25 |
| 6858.51 | 72.68 | | | 6884.62 | | 6904.21 | | 6907.47 | 96.2 |
| | | | | | | | | | |

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97.02
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                                                            92.5912452.91
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                                                                                                         92 36
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109.27 14260.3
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14230.78
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107.5914378.39
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102.7514384.95
14276.71
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14398.07 102.6414404.63 101.3814414.47
                                                           96.5214463.68
                                                                                  96.46 14575.2
                                                                                                         96.46
Manning's n Values
                                    num=
            n Values
n Val Sta
.066 4700.97
.06614299.67
                            Sta n Val
                                                                                                        n Val
                                                                                 n Val
    Sta
0
                                                   Sta n Val
                                                                          Sta
                                                                                                Sta
                                     .085 6623.47
                                                             .07 6723.73
                                                                                   .025 6781.23
                                                                                                           .07
                                       .06
 6907 47
Bank Sta: Left Right
                                    Lengths: Left Channel
                                                                                   Coeff Contr.
                                                                    Right
                                                                                                         Expan.
                                    1074.69 1235.01 1212.32
         6623.47 6907.47
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 6623.47 95.3 T
                           95.3
96.2
 6907 47 14575 2
6907.47 145/5.2 50.2

Left Levee Station= 32

Right Levee Station=14299.67
                                                    Elevation= 108.59
Elevation= 117.33
Blocked Obstructions num=
Sta L Sta R Elev
Sta L Sta R Elev
11311.3911901.83 96.25
CROSS SECTION OUTPUT Profile #Design Flow
                                104.32
  E.G. Elev (ft)
                                                    Element
                                                                                        Left OB
                                                                                                       Channel
                                                                                                                       Right OB
  E.G. Vel Head (ft, W.S. Elev (ft) Crit W.S. (ft) 86.83 E.G. Slope (ft/ft) 0.000126 Total (cfs) 125000.00 14189.88 1.08
                                                    Wt. n-Val.
Reach Len. (ft)
                                                                                           0.072
                                                                                                       0.063
1235.01
                                                                                                                       0.066
1212.32
                                                                                        1074.69
                                                    Flow Area (sq ft)
                                                                                                        9605.47
                                                                                                                      56807.98
                                                    Area (sq ft)
                                                                                      56806.30
                                                                                                       9605.47
                                                                                                                     65507.97
                                                    Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                       25445.79
                                   125000.00
                                                                                        43286.04
                                                                                                                       56268 18
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                        284.00
                                                                                                                       7328.18
                                                                                         0.89
7.43
3852434.0
                                                                                                          2 65
                                                                                                                           0 99
  Max Chl Dpth (ft)
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                    11124930.0
                                                    Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                                          2264662.0
                                                                                                                           5007838.0
                                   1163.76
57.26
                                                                                                   304.74
0.25
                                                                                        6582.67
                                                                                                                       7332.05
                                                                                            0.06
                                                                                                                           0.06
                                                    Stream Power (lb/ft s)
Cum Volume (acre-ft)
  Alpha
                                         1.82
                                                                                            0.05
                                                                                                           0.66
                                                                                                                           0.06
  Frctn Loss (ft)
                                                                                      111630.90
                                                                                                       43864.68
                                                                                                                       139999.90
                                                                                                                    17444 80
  C & E Loss (ft)
                                         0 00
                                                    Cum SA (acres)
                                                                                      15885 71
                                                                                                       1997 61
            Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
RIVER: Rio Grande
                                    RS: 151.27
Description: RGV-04, Original IBWC Cross-section data applied to this section
Station Elevation Data
                                    num=
                                                  82
                Elev
                          Sta
      Sta
         0
             103.64
                              34
                                       93.7
                                                            93.29
                                                                           90
                                                                                  95.73
                                                                                                658
                                                                                                         96.08
               97.35
                                                            94.92
                                                                                                         95.15
     2719
                            2740
                                     96.33
                                                  2776
                                                                         3434
                                                                                  95.14
                                                                                               3470
     4128
               95.37
                           4164
5454
                                     95.39
89.74
                                                  4822
5516
                                                            95.61
89.92
                                                                        4858
5552
                                                                                   95.62
                                                                                               5194
     5371
               96.75
                                                                                   90.02
                                                                                               6210
     6246
               91.99
                            6813
                                     92.84
                                                  6846
                                                             93.7
                                                                         6904
                                                                                   96.54
                                                                                               6908
                                                                                                          94.6
  7094 4
               68.72
                           7154
                                     71 67
                                                  7182
                                                            77 76
                                                                     7183 6
                                                                                   77 86
                                                                                            7187 6
                                                                                                         78 12
```

97.19 97.74 90.45

96.08

8414

9614

10334

11614

97.35

96.75

90.86

95.35

8100.1

8862.2 9774

98.15 11148.5

97.17

97.69 90.45 8136.1

8898.2

90.45 9834 96.18 11184.5 95.73 12672.7

7374

8674

9660.3

96.77 10422.4 95.17 11946.6

7370

8651

9624.3

10386.4

95.83

95.73 96.91

```
91.67 12750
96.97 14232.9
                                                                            98.98 13434.8
                                                                                                          98.1 13470.8
  14196.9
                                               96.92
                                                             14762
                                                                           96.14 14784 101.41 14798 101.01
                                 14959 113.29
Manning's n Values
        Sta n Val
                                     Sta
                                             n Val
                                                                 Sta
                                                                          n Val
                                                                                             Sta
                                                                                                       n Val
                                                                                                                                    n Val
                                  6813
                                                 .06
                                                               6846
                                                                             .066
                                                                                           6951
                                                                                                          .015
                                                                                                                       7201
                                                                                                                                      .066
                   .067
                                        Lengths: Left Channel Right
90 90 90
90 Flowation 103 64
Bank Sta: Left Right
                                                                                                         Coeff Contr.
                                                                                                                                    Expan.
                                                                                                                      . 2
                6904
                               7374
                                                                   Elevation= 103.64
Left Levee
                           Station=
                                              14959
Right Levee
                            Station=
                                                                  Elevation= 113.29
| Blocked Obstructions | num = 2 | Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R 
CROSS SECTION OUTPUT Profile #Design Flow
                                            104.19
                                                                                                                Left OB
   E.G. Elev (ft)
                                                                  Element
                                                                                                                                   Channel
                                                                                                                                                     Right OB
   Vel Head (ft)
W.S. Elev (ft)
                                             0.04
104.15
                                                                  Wt. n-Val.
Reach Len. (ft)
                                                                                                                  0.060
10.00
                                                                                                                                                         0.067
                                                                                                                                      0.043
   Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                  Flow Area (sq ft)
Area (sq ft)
                                                                                                             56089.66
56089.66
                                                                                                                                11664.75
11664.75
                                                                                                                                                    49794.75
                                                   89.83
                                             0.000094
   O Total (cfs)
                                             125000.00
                                                                    Flow (cfs)
                                                                                                               54490.22 32633.13
                                                                                                                                                     37876.65
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                  Top Width (ft)
                                                                                                                                                       0.76
                                                   1.06
                                                                  Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                    0.97
                                                                                                                                       2.80
                                              38.27
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                    8 12
                                                                                                                                     24.82
                                             12865350.0
                                                                  Conv. (cfs)
Wetted Per. (ft)
                                                                                                                 5608287.0
                                                                                                                                      3358694.0
                                                                                                                                                           3898372.0
                                                                                                                                  479.19
                                                  10.00
                                                                                                               6905.77
                                                                                                                                                      7507 84
                                                                                                                                   0.14
   Min Ch El (ft)
                                                                   Shear (lb/sq ft)
                                                                                                                    0.05
                                                   65.88
                                                                                                                                                           0.04
   Alpha
Frctn Loss (ft)
                                                                  Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                    2.33
                                                                                                                    0.05
                                                                                                                                        0.40
                                                                                                                                                           0.03
                                                                                                                                 1986.92 17238.37
   C & E Loss (ft)
                                                    0.00
                                                                  Cum SA (acres)
                                                                                                             15719.40
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
               Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note:
BRIDGE
RIVER: Rio Grande
REACH: Lower Reach
                                            RS: 151.255
Description: Pharr
Distance from Upstream XS =
Deck/Roadway Width = Weir Coefficient =
Upstream Deck/Roadway Coordinates
      num=
        Sta Hi Cord Lo Cord
                                                 Sta Hi Cord Lo Cord
                                                                                             Sta Hi Cord Lo Cord
                                                                                             694 119.06 110.98
2776 118.99 110.9
               125.18 103.64
                                                      0 125.18
      1388
                               110.9
110.9
110.9
                                                 2082 118.99
                 118.99
                                                                           110.9
                                                                                           2776
       3470 118.99
5552 118.99
                                                 4164
6246
                                                           118.99
                                                                            110 9
                                                                                            4858
                                                                                            6908
                                                           118.99
                                                                                                      118.95
                                                                                                                    110.87
                                                                            110.9
                               110.78
110.85
                                            7094.4
7374
    7001.2
                118.86
                                                           118 86
                                                                         110.78
                                                                                       7187.6
                                                                                                      118 86
                                                                                                                    110 78
                 118.93
                                                           118.97
                                                                          110.88
                                                                                        8136.1
                                                                                                      118.99
                               110.9 9660.3 118.99
110.9 11946.6 118.99
110.9 14232.9 124.87
                                             9660.3
   8898.2 118.99
                                                                          110.9 10422.4
                                                                                                      118.99
                                                                                                                      110.9
  11184.5 118.99
13470.8 118.99
                                                                            110.9 12708.7
                                                                        116.79
                                                                                         14959
                                                                                                     134.32 126.24
     14959 134.32 113.29
Upstream Bridge Cross Section Data
Station Elevation Data
                                             num=
                                 Sta
                                              Elev
        Sta
                    Elev
                                                                 Sta
                                                                             Elev
                                                                                            Sta
                                                                                                         Elev
                                                                                                                                     Elev
                                                                                           90
2046
                                   34
1352
                                                 93.7
                                                                            93.29
                                                                                                        95.73
         694
                                                               1388
                                               96.51
                                                                            96.53
                                                                                                        96.94
                                                                                                                        2082
                    96.1
                                                                                                                                    96.96
       2719
                   97.35
                                   2740
                                               96.33
                                                               2776
                                                                            94.92
                                                                                            3434
                                                                                                                        3470
                                                               4822
       4128
                   95.37
                                    4164
                                                                            95.61
                                                                                                                        5194
                                               95.39
                                                                                            4858
                                                                                                        95.62
                                                                                                                                    95.73
                   96.75
91.99
       5371
                                   5454
                                               89.74
                                                               5516
                                                                            89.92
                                                                                            5552
                                                                                                        90.02
                                                                                                                        6210
                                                                                                                                    91.89
                                               92.84
                                                                             93.7
       6246
                                    6813
                                                               6846
                                                                                            6904
                                                                                                        96.54
       6951
                     73 7
                               6997.2
                                               66 88
                                                           7001 2
                                                                            66 29
                                                                                            7004
                                                                                                        65 88
                                                                                                                    7090.4
                                                                                                                                    68 61
                    78.98
                                                            7276.8
                                                                                                                        7359
       7201
                                   7232
                                               90.66
                                                                            91.59
                                                                                        7280.8
                                                                                                        91.67
                                                                                                                                    93.29
                   95.83
95.73
                                               96.75
90.86
                                                           8100.1
8862.2
                                                                            97.17
97.69
                                                                                        8136.1
                                                                                                        97.19
97.74
       7370
                                   7374
                                                                                                                        8414
                                   8674
                                                                                                                                    97.35
                                                                                        8898.2
                                                                                                                        9614
       8651
                   96.91 9660.3
96.77 10422.4
                                               95.35 9774
98.15 11148.5
                                                                           90.45 9834
96.18 11184.5
95.73 12672.7
   9624.3
                                                                                                        90.45
                                                                                                                      10334
                                                                                                        96.08
  10386.4
                                                                                                                      11614
                                                                                                        93.07 12708.7
  11910 6
                   95.17 11946.6
                                               95.19
                                                             12594
                                                                                                                                    91 85
                   91.67 12750
96.97 14232.9
                                               91.67
                                                                            98.98 13434.8
                                                                                                          98.1 13470.8
                                                                                                      101.41
  14196.9
                                               96.92
                                                             14762
                                                                           96.14
                                                                                        14784
                                                                                                                      14798
                               14959
                                             113.29
Manning's n Values
                                            n Val
                                                                 Sta
                                                                                                      n Val
                                                                                                                                   n Val
        Sta n Val
                                                                          n Val
                                               .06
                                                                                                         .015
                   .06
                                                                                                                                     .066
           Ω
                                  6813
                                                               6846
                                                                             .066
                                                                                           6951
                                                                                                                        7201
Bank Sta: Left Right 6904 7374
                                              Coeff Contr. Expan.
                                              0
                                                          . 2
                     Station=
Left Levee
                                                               Elevation= 103.64
Right Levee
                            Station=
                                                                  Elevation=
     Scree Obstructions num=
Sta L Sta R Elev Sta L
0 6904 95.64 8414
                                                               2
Blocked Obstructions
                                                             Sta R
                                               Sta L Sta R Elev
8414 14959 97.35
Downstream Deck/Roadway Coordinates
      num= 28
Sta Hi Cord Lo Cord
                                                 Sta Hi Cord Lo Cord
                                                                                             Sta Hi Cord Lo Cord
                                                     0 125.18 117.1
082 118.99 110.9
                                                                                           694 119.06 110.98
2776 118.99 110.9
            0 125.18 103.64
       1388
                                 110.9
                                                 2082
       3470 118.99
                                110.9
                                                 4164 118.99
                                                                           110 9
                                                                                           4858
                                                                                                     118 99
                                                                                                                      110 9
                               110.9
                 118.99
                                                                                       7187.6
                                             7094.4
                                                                         110.78
    7001.2
                 118.86
                                                           118.86
                                                                                                      118.86
    7280.8
                118.93
118.99
                               110.85
                                            7374
                                                          118.97
118.99
                                                                         110.88 8136.1 118.99
110.9 10422.4 118.99
```

8898.2

118.99

11184.5

110.9 11946.6 110.9 14232.9

118.99

110.9 12708.7

Downstream Bridge Cross Section Data Joulo: Jaca num= Sta Station Elevation Data Elev Elev Elev Elev Elev 0 103.64 34 93.7 93.29 90 95.73 658 96.08 2082 3470 694 1388 2046 96.94 96.96 97.35 2719 2740 96.33 2776 94.92 3434 95.14 95.15 4128 95.37 4164 95.39 4822 95.61 4858 95.62 5194 95.73 6246 91.99 6813 92.84 6846 93.7 6904 96.54 6908 94.6 73.7 68.72 6997.2 7154 7001.2 7182 66.29 7094.4 7183.6 71.67 77.86 7187.6 7232 7201 78.98 90.66 7276.8 91.59 7280.8 91.67 7359 93 29 7374 8100.1 7370 95.83 96.75 97.17 8136.1 8414 97.35 8651 95.73 8674 90.86 95.35 8862.2 97.69 8898.2 9614 9660.3 98.15 11148.5 95.19 12594 90.45 9834 96.18 11184.5 95.73 12672.7 96.77 10422.4 96.08 11614 93.07 12708.7 10386.4 11614 94.92 98.98 13434.8 98.1 13470.8 12714 91.67 12750 91.67 12834 96.97 14232.9 97.76 14959 14196.9 96.92 14762 14784 101.41 14826 113.29 Manning's n Values num= Sta n Val 0 .06 7374 .06 Sta 6813 n Val .015 n Val Sta n Val 7374 Bank Sta: Left Right 6904 7374 Coeff Contr. Expan. .2 .5 Elevation= 103.64 Elevation= 113.29 Left Levee Station= Sta L Sta R 8414 14959 Elev Upstream Embankment side slope 0 horiz. to 1.0 vertical 0 horiz. to 1.0 vertical Downstream Embankment side slope Maximum allowable submergence for weir flow Elevation at which weir flow begins Energy head used in spillway design Spillway height used in design = Broad Crested Weir crest shape Number of Abutments = 2 Upstream ทเมฑ= Downstream num 50 93.2 2 num= Sta Elev 0 117.16 50 93 2 Abutment Data Elev 111 14959 126.6 Number of Piers = 24 Pier Data 694 Pier Station Upstream= Downstream= Upstream num= Elev Width o 60 36 119.42
nstream num= 2
Width Elev Width Elev 36 60 36 110 7 Width Downstream Pier Data Pier Station Upstream= 1388 Downstream= Upstream num= tream num= 2
Width Elev Width Elev
36 60 36 119.35
nstream num= 2
Width Elev Width Elev
36 60 36 119.35 36 Pier Data Pier Station Upstream= Pier Data Pier Station 2776 2776 Upstream= num= Upstream ev Width Elev 60 36 119.35 num= 2 Elev 60 Width 36 Downstream Width Elev Width Elev 36 60 36 119.35 Pier Data Pier Station Upstream= 3470 3470 num= 2 -h Elev Upstream ev Width Elev 60 36 119.35 num= 2 Width Elev Downstream Width Elev Width Elev 36 60 36 119.35 Pier Data Pier Station Upstream= 4164 Downstream= 4164

14959 134.32 113.29

| 1 11111CG Gt 10.42 011 00 00t 2 | 011 | |
|---|----------------|--------|
| Width Elev Width Elev | | |
| Width Elev Width Elev 36 60 36 119.35 Downstream num= 2 | | |
| Width Elev Width Elev
36 60 36 119.35 | | |
| Dier Data | | |
| Dier Station Instream- 4959 | Downstream= | 4858 |
| Upstream num= 2 Width Elev Width Elev 36 60 36 119.35 Downstream num= 2 | | |
| Downstream num= 2 | | |
| Width Elev Width Elev
36 60 36 119.35 | | |
| Pier Data | | |
| Pier Station Upstream= 5552
Upstream num= 2 | Downstream= | 5552 |
| Width Elev Width Elev
36 60 36 119.35 | | |
| Vistream Num 2 2 2 2 2 2 2 2 2 | | |
| 36 60 36 119.35 | | |
| Pier Data
Pier Station Upstream= 6246 | Downstream= | 6246 |
| Upstream num= 2 | 20 WIID CI COM | 0210 |
| Upstream num | | |
| Width Elev Width Elev 36 60 36 119.35 | | |
| | | |
| Pier Data
Pier Station Upstream= 6908 | Downstream= | 6908 |
| Pier Data Pier Station Upstream= 6908 Upstream num= 2 Width Elev Width Elev 4 60 4 119.31 Downstream num= 2 | | |
| 4 60 4 119.31
Downstream num= 2 | | |
| Width Elev Width Elev
4 60 4 119.31 | | |
| | | |
| Pier Data Pier Station Upstream= 7001.2 | Downstream= | 7001.2 |
| Upstream num 2 Width Elev Width Elev 4 60 4 119.22 Downstream num 2 Width Elev Width Elev 4 60 4 119.22 | | |
| 4 60 4 119.22
Downstream num= 2 | | |
| Width Elev Width Elev
4 60 4 119.22 | | |
| Place Body | | |
| Pier Station Upstream= 7094.4 | Downstream= | 7094.4 |
| Width Elev Width Elev | | |
| Upstream num | | |
| Width Elev Width Elev
4 60 4 119.22 | | |
| Pier Data | | |
| Pier Data Pier Data Pier Station Upstream= 7187.6 Upstream num= 2 Width Elev Width Elev 4 60 4 119.22 Downstream num= 2 | Downstream= | 7187.6 |
| Width Elev Width Elev 4 60 4 119.22 | | |
| Downstream num= 2
Width Elev Width Elev | | |
| 4 60 4 119.22 | | |
| Pier Data | D | 7200 0 |
| Pier Data Pier Station Upstream= 7280.8 Upstream num= 2 | Downstream= | 7280.8 |
| Width Elev Width Elev 4 60 4 119.29 Downstream num= 2 | | |
| Downstream num= 2 Width Elev Width Elev 4 60 4 119.29 | | |
| 4 60 4 119.29 | | |
| Pier Data
Pier Station Upstream= 7374 | Downstream= | 7374 |
| Upstream num= 2 Width Elev Width Elev | | |
| 4 60 4 119.33 | | |
| Upstream num 2 Width Elev Width Elev 4 60 4 119.33 Downstream num 2 Width Elev Width Elev 4 60 4 119.33 | | |
| | | |
| Pier Data
Pier Station Upstream= 8136.1 | Downstream= | 8136.1 |
| Upstream num = 2 Width Elev Width Elev 36 60 36 119.35 Downstream num = 2 2 | | |
| 36 60 36 119.35
Downstream num= 2 | | |
| Width Elev Width Elev
36 60 36 119.35 | | |
| nt. n. | | |
| Pier Station Upstream= 8898.2 | Downstream= | 8898.2 |
| Width Elev Width Elev | | |
| Pier Station Upstream= 8898.2 Upstream num= 2 Width Elev Width Elev 36 60 36 119.35 Downstream num= 2 | | |
| Width Elev Width Elev
36 60 36 119.35 | | |
| Diam Data | | |
| Pier Station Upstream= 9660.3
Upstream num= 2 | Downstream= | 9660.3 |
| Upstream | | |
| Downstream num= 2
Width Elev Width Elev | | |
| | | |

Downstream= 10422.4

```
num= 2
Elev Width Elev
36 119.35
        Width
                        60
                              60 36 119.35
num= 2
Downstream
                     Elev Width Elev
        Width
                                                       Elev
          36
Pier Data
                                Upstream= 11184.5
Pier Station
      r Station of 2
tream num= 2
Width Elev Width Elev
                                                                         Downstream= 11184.5
Upstream
                        60
                              50 36 119.35
num= 2
ev Width Elev
Downstream
        Width Elev Width Elev
36 60 36 119.35
Pier Data
Pier Station
                                Upstream= 11946.6
                                                                           Downstream= 11946.6
Pier Data
       c Station Upstream
tream num= 2
Width Elev Width Elev
36 60 36 119.35
nstream num= 2
Width Elev Width Elev
36 60 36 119.35
                              Upstream= 12708.7
Pier Station
                                                                            Downstream= 12708.7
Upstream
Downstream
Pier Data
Pier Station
                             Upstream= 13470.8
                                                                           Downstream= 13470.8
        tream num= 2
Width Elev Width Elev
Upstream
       | Second | S
Downstream
Pier Data
 Pier Station
                             Upstream= 14232.9
                                                                         Downstream= 14232.9
       Upstream
        nstream num= 2
Width Elev Width Elev
36 60 36 125.23
Downstream
Number of Bridge Coefficient Sets = 1
Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer
             Pressure and Weir flow
                      Submerged Inlet Cd = Submerged Inlet + Outlet Cd =
                      Max Low Cord
Additional Bridge Parameters
              Add Friction component to Momentum
              Do not add Weight component to Momentum
              Class B flow critical depth computations use critical depth
              inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                RS: 151.25
Description: RGV-04, Original IBWC Cross-section data applied to this section
Station Elevation Data num=
                                      Sta
                                                     Elev
                                                                                         Elev
                                                                                                                         Elev
                                                                                                                                                         Elev
         Sta
                        Elev
                                                                         Sta
                                                                                                                       95.73
96.94
                   103.64
          694
                                       1352
                                                                         1388
                                                                                                        2046
                        96.1
                                                      96.51
                                                                                       96.53
                                                                                                                                         2082 96.96
        2719
                     97.35
95.37
                                       2740
                                                      96.33
95.39
                                                                         2776
                                                                                       94.92
95.61
                                                                                                        3434
4858
                                                                                                                       95.14
95.62
                                                                                                                                          3470
        4128
                                        4164
                                                                         4822
                      96.75
91.99
                                                      89.74
92.84
        5371
                                        5454
                                                                         5516
                                                                                       89.92
                                                                                                         5552
                                                                                                                       90.02
                                                                                                                                          6210
                                                                                                                                                        91.89
                                                                         6846
                                                                                         93.7
                                         6813
                                                                                                         6904
                        73.7 6997.2
                                                      66.88 7001.2
                                                                                                                        65.88 7090.4
        6951
                                                                                       66.29
                                                                                                          7004
                                                                    7182
7276.8
                                                                                       77.76
91.59
                                      7154
                                                                                                   7183.6
                       78.98
                                         7232
                                                                                                     7280.8
                                                                                                                        91.67
        7201
                                                      90.66
                                                                                                                                         7359
                                                                                                                                                        93.29
        7370
                      95.83
95.73
                                        7374
                                                      96.75
90.86
                                                                   8100.1
8862.2
                                                                                       97.17
97.69
                                                                                                   8136.1
8898.2
                                                                                                                        97.19
97.74
                                                                                                                                          8414
                                         8674
                                                                                                                                          9614
        8651
                      96.91 9660.3
96.77 10422.4
95.17 11946.6
    9624.3
                                                      95.35
                                                                        9774
                                                                                       90.45
                                                                                                        9834
                                                                                                                        90.45
                                                                                                                                      10334
                                                      98.15 11148.5
                                                                                       96.18 11184.5
95.73 12672.7
                                                                                                                        96.08
                                                                                                                                        11614
  11910.6
                                                      95.19
                                                                      12594
                                                                                                                       93.07 12708.7
                                                                                                                                                        91.85
                     91.67 12750
96.97 14232.9
                                                                       12834
                                                                                       98.98 13434.8
                                                                                                     14784 101.41
  14196.9
                                                      96.92
                                                                                      96.14
                                                                                                                                       14798
                                                                       14762
                                   14959 113.29
Manning's n Values
       Sta n Val Sta n Val 0 .06 6813 .06
                                                                                      .066 6951
                                                                                                                      .015
                                                      .06
                     .06
                                                                        6846
                                                                                                                                        7201
                                                                                                                                                         .066
Bank Sta: Left Right 6904 7374
                                                    Lengths: Left Channel Right 12.07 10 22.96
                                                                                                                         Coeff Contr.
                                                    12.07
0 F1
Left Levee
                                                                            Elevation= 103.64
                              Station=
```

36 119.35

Upstream= 10422.4

Pier Station

```
Blocked Obstructions
    ocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R
0 6904 95.64 8414 14959
```

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 104.17 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|--------------|
| Vel Head (ft) | 0.04 | Wt. n-Val. | 0.060 | 0.043 | 0.060 |
| W.S. Elev (ft) | 104.14 | Reach Len. (ft) | 12.07 | 10.00 | 22.96 |
| Crit W.S. (ft) | 89.83 | Flow Area (sq ft) | 56011.91 | 11659.46 | 49710.21 |
| E.G. Slope (ft/ft) | 0.000088 | Area (sq ft) | 56011.91 | 11659.46 | 49710.21 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 52617.85 | 31560.82 | 40821.32 |
| Top Width (ft) | 14880.60 | Top Width (ft) | 6904.00 | 470.00 | 7506.60 |
| Vel Total (ft/s) | 1.06 | Avg. Vel. (ft/s) | 0.94 | 2.71 | 0.82 |
| Max Chl Dpth (ft) | 38.26 | Hydr. Depth (ft) | 8.11 | 24.81 | 6.62 |
| Conv. Total (cfs) | 13292410.0 | Conv. (cfs) | 5595343.0 | 3356155 | .0 4340909.0 |
| Length Wtd. (ft) | 15.16 | Wetted Per. (ft) | 6905.76 | 479.19 | 7507.74 |
| Min Ch El (ft) | 65.88 | Shear (lb/sq ft) | 0.04 | 0.13 | 0.04 |
| Alpha | 2.15 | Stream Power (lb/ft s) | 0.04 | 0.36 | 0.03 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 110126.70 | 43539.80 | 138295.80 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 15705.66 | 1985.98 | 17223.34 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Rio Grande

RS: 151.24 REACH: Lower Reach

Description: RGV-04, Updated on left with new survey to Station1031.87.

Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data num= 450

| Station E | | ı Data | num= | 450 | | | | | |
|-----------|--------|----------|--------|----------|--------|----------|--------|----------|--------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 101.66 | 3 | 100.51 | 13 | 100.47 | 29 | 104.4 | 46 | 105.14 |
| 71 | 97.36 | 88.99 | 92.8 | 114.99 | 92.02 | 146.99 | 94.51 | 151.98 | 93.53 |
| 174.98 | 02.20 | 182.98 | 95.51 | 196.98 | | 209.98 | 93.17 | 214 00 | 94.86 |
| | 93.28 | | | | 92.35 | | | 214.98 | |
| 232.97 | 95.24 | 243.97 | 93.45 | 254.97 | 94.01 | 287.97 | 94.58 | 372.96 | 94.51 |
| 456.95 | 94.7 | 576.93 | 94.75 | 643.92 | 95.04 | 769.9 | 95.22 | 793.9 | 96.15 |
| 805.9 | 94.91 | 870.89 | 95.42 | 952.88 | 95.28 | 989.88 | 95.61 | 1031.87 | 95.55 |
| 1134.76 | | 1157.72 | 95.63 | | 95.82 | 1269.22 | 95.74 | 1302.02 | 96.41 |
| | | | | | | | | | |
| 1354.5 | | 1384.01 | 97.57 | 1400.41 | 97.03 | 1436.49 | 97.48 | 1456.17 | 98.04 |
| 1488.96 | 97.32 | 1515.2 | | 1538.16 | | 1554.55 | | 1570.95 | 95.89 |
| 1584.07 | 96.43 | 1610.31 | 96.49 | 1718.54 | 96.31 | 1748.05 | 96.47 | 1771.01 | 96.28 |
| 1807.09 | 96 48 | 1879.24 | 96 43 | 1980.91 | 96 53 | 1997.31 | 96 34 | 2033.38 | 96.58 |
| 2072.74 | | 2108.82 | 96.69 | | 96.53 | 2190.81 | | 2279.36 | 96.64 |
| | | | | | | | | | |
| 2321.99 | | | | 2561.41 | 96.57 | 2597.48 | 96.87 | 2643.4 | 96.61 |
| 2659.8 | | 2708.99 | | 2725.39 | | 2751.63 | | 2768.02 | 95.61 |
| 2777.86 | 94.06 | 2784.42 | 95.05 | 2820.5 | 94.4 | 2869.69 | 94.34 | 2876.25 | 94.71 |
| 2905.77 | 94.35 | 2977.92 | 94.19 | 3017.28 | 94.61 | 3046.79 | 94.28 | 3174.7 | 94.66 |
| 3194.38 | | 3243.57 | | 3250.13 | | 3302.61 | | 3387.88 | 95.19 |
| | | | | | | | | | |
| 3417.39 | | 3473.15 | | 3486.27 | 95.54 | 3528.9 | | 3594.49 | 95.56 |
| 3630.57 | 95.41 | 3660.09 | 95.58 | 3768.32 | 95.65 | 3814.23 | 95.51 | 3843.75 | 95.72 |
| 3929.02 | 95.58 | 3948.7 | 95.89 | 4011.01 | 95.74 | 4040.53 | 95.95 | 4188.11 | 95.55 |
| 4227.46 | 95.54 | 4270.1 | | 4293.05 | | 4319.29 | | 4355.36 | 94.82 |
| 4411.12 | | 4437.35 | | 4473.43 | | 4522.62 | | 4575.09 | 95.85 |
| | | | | | | | | | |
| 4594.77 | | 4627.57 | | 4657.08 | 95.98 | 4670.2 | | 4699.72 | 96.24 |
| 4712.84 | 95.82 | 4752.19 | 96.36 | 4814.5 | 95.88 | 4866.97 | 94.84 | 4886.65 | 94.65 |
| 4948.96 | 94.88 | 5057.19 | 94.97 | 5126.06 | 95.27 | 5162.13 | 95.57 | 5194.93 | 95.37 |
| 5290.03 | | 5316.27 | | 5358.91 | | 5394.98 | | 5414.66 | 96.35 |
| | | | | | | | | | |
| 5437.61 | | 5473.69 | | 5496.65 | | 5516.32 | | 5542.56 | 91.53 |
| 5565.52 | | 5591.75 | | 5673.74 | | 5699.98 | | 5755.73 | 89.26 |
| 5834.44 | 89.36 | 5844.28 | 89.23 | 5945.94 | 89.35 | 5998.42 | 89.2 | 6090.24 | 89.32 |
| 6113.2 | 89.97 | 6146 | | 6168.95 | 91.07 | 6221.43 | 91.84 | 6241.1 | 91.72 |
| 6267.34 | | 6323.09 | | 6349.33 | | 6388.68 | | 6431.32 | 91.66 |
| | | | | | | | | | |
| 6480.51 | | 6490.35 | | 6549.38 | | 6611.69 | | 6670.72 | 92.84 |
| 6736.31 | | 6815.02 | | 6844.54 | | 6874.05 | | 6910.13 | 93.38 |
| 6926.53 | 88.78 | 6936.36 | 86.8 | 6942.92 | 87.2 | 6949.48 | 86.27 | 6965.88 | 78.85 |
| 6972.44 | 73.25 | 6975.72 | 72.21 | 7090.4 | 68.61 | 7094.4 | 68.72 | 7175.78 | 72.21 |
| 7182.34 | | 7195.46 | | 7215.14 | | 7221.69 | | 7251.21 | 88.22 |
| | | 7290.57 | | 7346.33 | 90.76 | 7221.00 | | 7392.24 | 91.17 |
| 7274.17 | | | | | | 7385.68 | | | |
| 7418.48 | 91.93 | 7431.6 | | 7441.44 | | 7474.24 | | 7598.87 | 94.66 |
| 7621.83 | 94.48 | 7667.75 | 95.08 | 7693.98 | 95.18 | 7713.66 | 94.81 | 7749.74 | 94.73 |
| 7762.86 | 94.94 | 7785.82 | 94.62 | 7838.29 | 94.54 | 7848.13 | 94.28 | 7900.61 | 94.64 |
| 7923.57 | | 7972.77 | 94.62 | 7999 | | 8021.96 | | 8090.84 | 95.18 |
| 8153.15 | | 8182.67 | | 8205.63 | | 8261.39 | | 8274.51 | 96.34 |
| | | | | | | | | | |
| 8294.19 | | 8317.15 | | 8340.11 | | 8386.03 | | 8448.35 | 95.39 |
| 8517.23 | 95.37 | 8536.91 | 94.78 | 8579.55 | 94.82 | 8589.39 | 94.47 | 8622.19 | 94.75 |
| 8674.67 | 93.95 | 8691.07 | 92.93 | 8720.59 | 93.25 | 8756.67 | 94.57 | 8779.63 | 94.75 |
| 8822.27 | | 8855.07 | | 8868.19 | | 8894.43 | | 8933.79 | 96.46 |
| | | 8996.11 | | | | 9068.27 | | | 96 |
| 8960.03 | | | | 9028.91 | | | | 9091.23 | |
| 9150.27 | | 9166.67 | | 9206.03 | | 9261.79 | | 9343.79 | 95.54 |
| 9419.23 | 95.64 | 9481.55 | 95.29 | 9576.67 | 95.32 | 9632.43 | 94.9 | 9645.55 | 94.42 |
| 9661.95 | 95.24 | 9675.07 | 94.61 | 9698.03 | 94.53 | 9714.43 | 94.86 | 9730.83 | 93.91 |
| 9753.79 | 91 28 | 9770.19 | | 9789.87 | 89 99 | 9802.99 | 90 25 | 9825.95 | 89.83 |
| 9835.79 | | 9855.47 | | 9871.87 | | 9911.23 | | 9937.47 | 91.83 |
| | | | | | | | | | |
| 9947.31 | | 9963.71 | | 10022.75 | | 10062.11 | | 10075.23 | 92.14 |
| 10101.47 | 92.381 | .0130.99 | 91.82 | 10144.11 | 91.87 | 10180.19 | 93.34 | 10193.31 | 94.81 |
| 10206.43 | 94.481 | 0222.83 | 95.11 | 10229.39 | 96.02 | 10242.51 | 96.083 | 10252.35 | 96.96 |
| 10265.47 | 96.121 | 0294.99 | | 10304.83 | 95.99 | 10331.07 | 97.3 | 10357.31 | 95.73 |
| 10363.87 | | 0380.27 | | 10399.95 | | 10406.51 | | 10445.87 | 96.57 |
| | | | | | | | | | |
| 10458.99 | | .0481.95 | | 10495.07 | | 10518.03 | | 10537.71 | 93.83 |
| 10557.39 | 93.991 | .0573.79 | 93.64 | 10596.75 | 93.71 | 10662.33 | 93.92 | 10685.28 | 94.19 |
| 10708.23 | 94.881 | 0718.07 | 94.41 | 10744.29 | 94.65 | 10770.52 | 94.011 | 10816.42 | 94.15 |
| 10829.53 | 94 841 | 0842.64 | 94 | 10862.31 | 93 5 | 10918.04 | 93 6 | 10927.88 | 94.03 |
| 10967.22 | | .0980.33 | 94.16 | 11000 | | 11055.73 | | 11078.68 | 92.96 |
| | | | | | | | | | |
| 11111.46 | | .1131.13 | | 11147.53 | | 11183.59 | | 11196.7 | 93.31 |
| 11242.6 | | 1275.38 | | 11288.49 | | 11344.23 | | 11363.9 | 93.14 |
| 11409.79 | 92.821 | 1432.74 | 93.52 | 11442.58 | 92.73 | 11501.58 | 92.93 | 11557.32 | 92.9 |
| 11573.71 | | 1593.38 | | 11609.77 | | 11662.22 | | 11757.29 | 93.35 |
| 11767.13 | | 1790.08 | | 11816.3 | | 11832.7 | | 11862.2 | 93.57 |
| | | | | | | | | | |
| 11878.59 | | .1911.38 | | 11983.5 | | 12058.9 | | 12101.52 | 94.55 |
| 12134.3 | | 2173.64 | | 12209.7 | | 12239.21 | | 12255.6 | 94.25 |
| 12285.1 | 94.841 | 2294.94 | 94.22 | 12314.61 | 94.6 | 12347.39 | 93.94 | 12376.9 | 94.19 |
| 12390.01 | | 12406.4 | | 12435.91 | | 12445.74 | | 12458.85 | 93.93 |
| 12465.41 | | 2478.52 | | 12508.03 | | 12544.09 | | 12553.93 | 93.6 |
| | | | | | | | | | |
| 12563.76 | | 2593.27 | | 12616.21 | | 12635.88 | | 12665.39 | 93.59 |
| 12691.62 | 94.11 | 2737.51 | 95.91 | 12750.62 | 96.92 | 12757.18 | 96.23 | 12770.29 | 97.38 |
| | | | | | | | | | |

```
99.3612826.03
97.7412937.49
12901.43
              98.2412914.54
                                                      97.7912976.83
                                                                           97.0313058.79
                                                                                               96.71
99.63
13294.83
              99.7913307.94
                                  97.4613317.77
                                                      98.6913327.61
                                                                              9913347.28
                                                                                               97.93
                                  96.8 13586.6
95.7613727.56
97.7413819.36
96.9513960.33
13452.19
                                                                           96.1713632.49
              96.9413507.92
                                                       95.9813599.71
13652.16
              95.9213701.34
                                                      96.6513734.12
                                                                           96.2813770.18
                                                                                               96.46
                                                                           97.4913852.14
97.2714012.78
13789.85
                 9713793.13
                                                       97.0513832.47
              97.4613920.99
13868.53
                                                      96.9413966.88
14042.28
              97.0214075.07
                                  96.5414117.68
                                                      96.7914199.64
                                                                           96.6114225.87
                                                      95.5114602.88
95.7114776.63
99.5914845.46
14429.12
              96.4214438.96
                                  96.1514527.47
                                                                           95.3314632.38
                                                                                               95.63
14806.13
              95.94 14825.8
                                  99.5214835.64
                                                                           97.8414868.29
                                                                                                 96.9
14897 64
              97.9514904.17
                                  98.66
                                            14927
                                                      99.4514946.57
                                                                          100.8314966.14
                                                                                              104 64
                                 107.2314995.49
            105.0114988.97
                                                     109.8415002.02
14975.92
                                                                          111.0415021.59
                                                                                              110.06
15044.42 104.0615054.21
                                103.8415067.25 100.4915073.78
                                                                          97.6315086.82
Manning's n Values
                                n Val
           n Val Sta
.06 6874.05
                                               Sta
                                                     n Val
                                                      .015 7195.46
                                  .066 6972.44
                                                                            .066 7598.87
                                                                                                .067
Bank Sta: Left
                    Right
                                 Lengths: Left Channel
                                                                Right
                                                                            Coeff Contr.
                                                                                               Expan.
        6910.13 7474.24 evee Station=
                    7474.24 2853.84 2485 1923.56
Station= 46 Elevation= 105.14
Station=15002.02 Elevation= 111.04
Left Levee
Right Levee
| Sta L | Sta R | Elev | Sta L | Sta R | Elev | 9.01 | 6913.8 | 93.4 | 8392.1114981.41 | 96.85
CROSS SECTION OUTPUT Profile #Design Flow
                                  104.17
  E.G. Elev (ft.)
                                                Element
                                                                                               Channel
                                                                                                            Right OB
                                               Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                0.060
                                                                                                            0.067
  Vel Head (ft)
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                              2485.00
                                104.14
                                                                                            12533.10
  E.G. Slope (ft/ft) 0.000078
                                                                                                           55213.12
                                                                               61450.63
                                                                                            12533.10
                                                Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
  O Total (cfs)
                                125000.00
                                                                                57974 68
                                                                                              25965.39
                                                                                                            41059 93
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                               564.11
                                14914.38
                                                                                                            7489.34
                                     0.97
                                                                                   0.94
                                                                                                 2.07
                                                                                                                0.74
  Max Chl Dpth (ft)
                                                Hydr. Depth (ft)
                                14139560.0
  Conv. Total (cfs)
Length Wtd. (ft)
                                                Conv. (cfs)
Wetted Per. (ft)
                                                                                  6557890.0
                                                                                                2937113.0
                                                                                                                4644553.0
                                                                                                            7491.40
                                                                                               573.10
  Min Ch El (ft)
                                                Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                 0.04
                                                                                               0.11
                                   68.61
                                                                                                              0.04
  Alpha
                                      1.59
                                                                                    0.04
                                                                                                  0.22
                                                                                                                0 03
  Frctn Loss (ft)
                                                                               110110.40
                                                                                              43537.02
                                                                                                         17219.39
  C & E Loss (ft)
                                     0.00
                                               Cum SA (acres)
                                                                              15703 75
                                                                                              1985.86
           Manning's n values were composited to a single value in the main channel
           Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                 RS: 150.78
Description: RGV-04, Updated on left with new survey to Station1090.94.

Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data num= 459
                       Sta
                                 Elev
                                             Sta
      Sta
              Elev
                                                        Elev
                                                                            Elev
                                92.5 25 93.23 40
108.31 104.99 107.63 138.99
                                                                         100.33 51 101.27
96.11 148.99 93.57
       65 100.62
                            88
  160.99
298.98
              92.17 176.99
94.78 320.98
                                  91.92 194.99
95.08 413.98
                                                      93.79 234.99
95.44 561.97
                                                                           95.17 283.98
95.44 632.96
                                                                                                 95.9
                      744.96
987.95
                                  96.37 769.96
96.85 1008.94
                                                      96.21 868.95
96.39 1039.94
                                                                                               96.45
  721 96
              96.05
                                                                           96.22
                                                                                   920.95
                                                                           96.41 1090.94
               96.4
 1121.65
              96.85 1141.33
                                  95.99 1167.56
                                                      94.03 1213.48
                                                                           92.74 1272.51
                                                                                               92.71
              92.95 1380.74
93.71 1646.4
                                  93.24 1446.34
93.53 1685.75
                                                      93.22 1505.37
93.84 1718.55
                                                                           93.58 1525.05
93.7 1761.19
 1570.97
                                                                                               94.02
                                  94.42 1823.5
88.88 2338.41
  1790.7
               94.5 1816.94
                                                      93.84
                                                              1839.9
                                                                            90.1 1849.74
                                                        89.5 2400.72
                                                                           90.31 2417.12
95.73 2617.18
 2240.02
              88.65 2246.58
                                                                                               90.18
              90.7 2499.11
95.92 2659.81
                                  94.37 2512.23
96.55 2699.17
                                                      94.38 2525.35
95.74 2718.84
 2453.19
                                                                            96.8
                                                                                   2741.8
                                                                           94.93 2909.06
96.37 3036.97
  2758 2
              96 82 2807 4
                                  96 98 2836 91
                                                      95.32 2863.15
                                                                                               95 96
```

96.28 2977.94 98.73 3063.21

96.55 3214.07 96.25 3407.57

92.78 3663.38

91.83 3899.51

91.88 4312.74

92.96 4483.29 94.23 4916.19

93.99 5306.46 86.4 5398.29

85.4 6310.02 85.55 6533.03

86.45 6683.89 85.39 7041.37

85.44 7297.18

85.92 7497.23 85.17 7608.74

85.54 7871.11

88.45 7966.21

92.11 8048.2

96.62 8189.23

95.99 8379.45

95.9 8635.26 96.72 8779.57

96.57 8920.11 97.29 9083.49

96.1 9181.52

96.26 9318.83

86 71 9387 68

71.62 9623.71

90.01 9669.61

88.07 9771.24

57.3

9510

3043.53

3155.04 3391.17

3607.63

3824.08

4178 28

4909.63

5257.27

5378.61

6267.38

6526.47

6674 05

7270.94

7428.36 7589.06

7831.75

8025.25

8156.43

8353.21

8743.49 8913.58 9037.74

9155.38

9374 56

9617.16 9659.78

9761.4

9498

96.29 3004.17 97.06 3082.88

97 3289.5 95.28 3430.53

91.89 3728.97 91.77 3942.15

91 85 4365 22

92.92 4584.95

93.97 5040.82

93.82 5335.98 86.47 5411.41

85.65 6323.14 85.9 6582.23

86.02 6703.57 85.51 7110.24

85.61 7349.65

85.42 7510.35 85.53 7641.53

85.33 7900.62 87.71 7979.33

95.34 8061.32

96.53 8212.18

95.85 8654.94 96.45 8822.08

96.3 8949.52 96.03 9109.63

96.08 9207.66

82.64 9397.51

73.19 9630.27 88.45 9686

88.64 9790.91 92.92 9885.98

98.6 9331.94

8418.8

9519

95.57

56.8

97.1 3017.29 96.34 3109.12

96.85 3325.58 93.21 3453.48

92.03 3771.61 91.93 4027.42 92.12 4394.74

94.89 5349.1 85.78 5440.93

85.41 6454.32 85.9 6608.46

86.24 6749.49

85.39 7133.2 85.37 7375.89

85.76 7530.03 85.33 7713.69

85.56 7936.7 88.39 7995.73

96.11 8248.26

96.65 8445.04

97.32 8691.02 96.61 8854.76

96.94 8956.05 95.97 9119.43

98.42 9351.61

77.67 9404.07

77.59 9646.66 87.56 9708.95

88.24 9817.14

9243.6

9541

8081

96.37

95.45

57.7 56.7

4801.4 93.71 5047.38 96.43 3132.08

97.15 3341.98 92.75 3499.4

91.74 3794.57

91.67 4089.73 93 4427.53

93.34 4873.56

93.84 5175.28

85.4 6500.23

85.66 6664.22

85.52 6808.52 85.58 7188.95

85.31 7562.82 85.79 7776

85.48 7943.26 87.07 8008.85

95.71 8123.63

96.52 8294.18

96.3 8490.96

96.96 8723.81 97.1 8880.9 96.56 9011.6 96.65 9148.84

95.79 9289.35

73 36 9410 62

91.62 9830.25

9550

9731.9

57.3 57.24

83.7 88.48

85.6 7411.96

5460.6

86.29

97.55

92.91

92 11

92 68

93.78

85.4

85 68

85.51

85.31

96.37

96.47

96.85

71 62

73.26

89.23

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93.8710020.39
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10046.62
              97.9110059.73
                                    98.410089.24
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                                                                                                 96.69
97.39
10295.84
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                                                                                                 95.51
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                                                        97.5410479.55
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 10522.2
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                                                       96.3510610.77
                                                                            96.67 10656.7
                                                                                                 95.11
10679.66
10810.88
              96.510702.62
93.9810833.84
                                   95.9510728.87
94.1410856.81
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95.5310896.17
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10915.86
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                                                       96.5210961.78
                                                                            96.6910981.47
                                                                                                 95.52
                                                                            95.7111115.97
94.7711204.54
                                  95.6211171.74
94.77 11312.8
94.4811499.79
11142.21
              95.0811152.05
                                                       94.92 11194.7
                                                                                                 95.25
                                                       94.3411325.92
94.1911552.27
11457.14
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                                                                            94.3611608.04
                                                                                                 94 2
11621.16
              94.2711660.53
                                   94.0111680.21
                                                       94.2411713.02
                                                                            93.97 11732.7
                                   94.23 11883.6
                                                       93.9712024.67
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11811.43
              94.03 11867.2
                                                                                                  94.4
                                                                            95.4612198.53
95.58 12356
9612431.45
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95.712247.74
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                                                       94.512175.57
95.0912326.47
                                                                                                 94.98
              97.26 12388.8
97.3812470.81
                                                       97.3512411.76
95.0912500.34
12369.12
                                   96.5512398.64
                                                                            95.8812588.91
95.7512766.06
96.2112874.32
12526.58
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                                   97.2712565.95
                                                       97.2412572.51
                                                                                                 98.23
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96.1412818.55
                                  96.1212697.17
96.0712831.67
                                                       96.3412733.25
95.2912841.51
12605 31
12789.02
12903.84
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                                  97.1112998.97
95.8813149.88
                                                       96.6213015.38
96.0813192.52
                                                                            96.9913035.06
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13094.11
               96.313123.63
13310.62
              93.8213382.79
                                   93.4513461.52
                                                       93.2113481.21
                                                                             93.413546.82
                                                                                                 95.24
                                  94.713664.92
98.7813789.57
                                                                            99.3613825.66
98.79 13986.4
97.5 14088.1
13750.21
              97.0913773.17
                                                       98.6213805.98
                                                                                                 99.44
13855 18
               98.613914.23
                                   98.5713956.88
                                                       97.8813976.56
97.0714055.29
              97.6614015.93
97.9914147.15
13999.53
                                   98.2914038.89
                                                                                                 97.53
14114 34
                                   97.6314179.95
                                                        98.514212.76
                                                                            98.54
                                                                                     14239
                                                                                                  98 2
                                                       98.24 14373.5
                                                                            98.4814406.31
14288.21
              98.1314330.86
                                   98.45 14357.1
                                  97.1214498.16
95.64 14777
95.3515095.21
95.5815337.97
14429.27
              97.9114462.08
                                                       97.5214527.69
                                                                            97.0314553.93
                                                                                                 96.25
              95.7415072.25
95.33 15265.8
95.54 15518.4
                                                                            95.3615150.98
95.3615459.35
95.5815616.81
                                                       95.7915101.77
14970.55
                                                                                                  95.7
 15249.4
                                                        95.1915436.39
15495.43
                                   96.1715544.64
                                                       95.6315603.69
                                                                                                 95.91
              95.915659.46
95.79 15820.2
                                                       96.5515705.39
95.3815862.85
15646 34
                                   95.54 15685.7
                                                                            95 6315748 03
                                                                                                 95 48
                                   95.0215856.29
                                                                            94.91 15905.5
                                                                                                 95.11
15944.86
              94.8815974.39
                                   93.9215987.51
                                                       94.5916000.63
                                                                            96.3616007.19
                                                                                                  98.1
               98.316026.88
                                  96.0716046.56
                                                        94.0816105.61
              96.1616164.66
                                                                           104.2316194.18 106.32
16151.53
                                  98.47 16174.5
                                                     102.0116187.62
16220.42 106.2216236.83 101.9816253.23
Manning's n Values
     Sta n Val Sta n Val
0 .06 88 .066
                                               Sta
                                                      n Val
                                                                                               n Val
                                 .066 9318.83
                                                         .07 9410.62
                                                                             .025 9623.71
Coeff Contr.
Ineffective Flow
Sta L Sta R
0 9318.83
                          98 6
 9938.4316263.07
9938.4316263.07 90.11

Left Levee Station= 88

Right Levee Station=16194.18
                                                 Elevation= 108.31
Right Levee Station=16194.18 Elevation= 106.32
Blocked Obstructions num= 2
Sta L Sta R Elev Sta L Sta R Elev
 Sta L Sta R Elev Sta L Sta R Elev
1825.35 2606.2 94.44 5344.23 8366.2 94.94
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
Vel Head (ft)
                                 103.92
                                                                                                             Right OB
                                                 Wt. n-Val.
                                                                                    0.066
                                      0.04
                                                                                                  0.056
                                                                                                                0.066
                                                Reach Len. (ft)
Flow Area (sq ft)
  W.S. Elev (ft)
Crit W.S. (ft)
                                    103.88
                                                                                               2485.16
                                                                                                              3297.89
                                                                                 2017.47
                                                                                48523.43
                                                                                              14713.20
                                                                                                             48184.20
                            84.99
0.000138
125000.00
16069.49
                                     84.99
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                Area (sq ft)
Flow (cfs)
                                                                                83574.93
                                                                                              14713.20
                                                                                                            50479.58
                                 125000.00
                                                                                 38828.39
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                 9202.77
                                                                                                 619.60
                                                                                                             6247.12
                                     1.12
                                                                                                 2.48
  Max Chl Doth (ft)
                                                                                     5.27
                                                                                                                  7.71
  Conv. Total (cfs)
Length Wtd. (ft)
                                 10650760.0
2467.50
                                                                                   3308415.0 3114453.0
                                                                                                                  4227894.0
                                                                                                             6251.71
                                                                                                653.38
                                                                                 9207.17
                                                 Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                     0.05
  Min Ch El (ft)
                                     56.38
                                                                                                   0.19
                                                                                                                  0.07
                                                                                                   0.48
  Alpha
                                      1.93
  Freth Loss (ft)
                                      0.38
                                                 Cum Volume (acre-ft)
                                                                                105359 70
                                                                                               42759 85
                                                                                                             135934 50
                                                                                                           16916.10
  C & E Loss (ft)
                                                 Cum SA (acres)
                                                                                               1952.10
           Manning's n values were composited to a single value in the main channel.
Note:
Note:
           Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                 RS: 150.31
REACH: Lower Reach
Description: RGV-04, Updated on left with new survey to Station1086.76.

Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data
                                 num=
                                             461
     Sta Elev
0 92.72
                        Sta
16.99
                                  Elev
88.39
                                             Sta
24.99
                                                               29.99
74.98
146.96
                                                                                     37.99
                                                       91.58
                                                                            95.84
                                                                                                 99.96
  50.99
103.97
            100.94 63.98
107.64 108.97
                                 100.16 67.98
106.82 128.97
                                                       101.9
                                                                          102.81 93.79
                                                                                    85.98
159.96
                                                                                               107.29
  167.96
              91.13 184.96
                                  92.85
                                          195.95
                                                       94.94 226.95
                                                                            94.47 272.94
                                                                                                 94.23
  399.91
                      439.9
791.83
                                                               600.87
                                   94.34
                                           558.88
                                                                            94.09
              94.13
  751.83
              94.19
                                   94.05
                                           881.81
                                                       94.19
                                                                 922.8
                                                                            93.96 1086.76
                                                                                                 93.78
              94.19 1180.49
                                   94.09 1210.01
                                                       93.52 1226.4
91.41 1432.99
              91.26 1298.54
                                   91.49 1387.08
 1259.19
                                                                            91.55 1583.83
                                                                                                  91.5
 1659.25
              91.38 1675.64
91.51 1980.6
                                  91.55 1737.95
91.25 2098.65
                                                       91.39 1774.02
91.55 2108.49
                                                                            91.53 1911.74
92.08 2144.56
 1964.21
                                                       91.47 2328.2
91.53 2600.38
 2229.82
               91.5 2252.78
                                   91.78 2285.57
                                                                            91.66 2357.71
                                                                                                 91.44
```

2633 17

3485.77

4131.9

4604.2

92 9 2741 39

93.42 3023.4 93.57 3538.24

93.66 3908.86 93.79 4256.53

93.94 4640.27

93.46 2836.48

93.61 3072.59 93.46 3584.15

93.8 3954.78 93.7 4338.53

94.5 4679.63 94.24 4958.42 93 49 2882 39

93.61 3636.62

93.64 4007.26 93.96 4459.88

93.99 4751.79

93.4 3154.57

93 24 2941 42

93.23 3262.78

93.49 3666.14

93.85 4082.7 93.94 4522.2

94.37 4791.15

93 58

93.75

94.36 5329.04

```
94.21 5453.68
93.97 5830.86
93.49 6158.84
                                                                94.15 5712.78
93.58 6103.08
 5558.63
5958.77
                94.14 5565.19
93.74 6007.97
                                        94.31 5686.54
93.81 6034.21
                                                                                                                94.02
92.41
                94.01 6191.64
85.75 6329.39
 6168.68
                                        95.08 6224.44
                                                                91.89 6234.28
                                                                                        92.78 6250.68
                                                                                                                86.83
 6267.08
                                        85.72 6335.95
                                                                85.41 6414.67
                                                                                          85.4 6427.79
                                                                                                                  85.9
 6493.39
                85.83 6545.86
                                        85.45 6637.7
                                                                85.64 6677.06
                                                                                         85.94 6693.46
                                                                                                                85.64
 6726.25
6791.85
                86.29 6739.37
95.66 6818.09
                                        85.95 6755.77
95.35 6857.45
                                                                                        96.68 6785.29
94.74 6890.25
                                                                93.16 6768.89
                                                                95.42 6867.29
                                        94.9 7018.16
96.02 7126.4
94.62 7378.94
94.33 7565.9
91.86 7765.97
                                                                95.42 6867.29
95.25 7037.84
95.48 7172.31
95.21 7395.34
93.79 7621.65
91.25 7785.64
 6923.05
                94.48 6949.28
                                                                                        95.05 7073.92
95.52 7201.83
                                                                                         94.67 7431.42
  7244.47
                95.54 7323.19
                                                                                                                94.93
                94.19 7539.66
91.57 7733.17
93.77 7887.32
                                                                                        93.64 7674.13
91.45 7844.68
 7716.77
                                                                                                                 94.21
   7857 8
                                        94.37 7900.44
                                                                93.67 7962.76
                                                                                         93.89 8015.23
                                                                                                                93 21
                93.57 8064.43
                                        93.25 8077.55
                                                                94.08 8097.23
                                                                                         93.43 8169.39
 8041.47
                                                                                                                93.43
 8185.79
                94.57 8198.91
94.17 8385.88
                                        93.55 8238.27
95.48 8418.68
                                                                92.83 8297.31
95.22 8435.09
                                                                                        93.22 8326.84
                                                                                                                94.21
                                        95.35 8664.71
97.41 8851.68
                                                                                        95.28 8595.82
95.7 8713.91
96.01 8917.29
 8477.73
                96.13 8484.29
                                                                95.96 8523.65
                                                                                                                95.32
                                                                95.06 8707.35
96.22 8877.92
 8805.76
                95.92 8835.28
                                                                                                                96.42
                95.44 8976.33
85.97 9074.74
                                        95.22 9009.13
86.76 9110.82
                                                                93.96 9028.82
86.97 9133.78
                                                                                        94.79 9041.94
86.5 9192.83
 8943.53
                                                                                                                  91 9
 9055.06
 9235.47
9360.12
                88 9245.31
86.81 9389.65
                                        88.66 9265
85.74 9412.61
                                                                86.89 9297.8
90.08 9422.45
                                                                                        85.96 9320.76
90.86 9442.13
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                91.54 9507.74

88.47 9593.02

93.01 9734.07

92.45 9940.73

92.4410170.35

93.3510340.92
                                                                                        90.86 9442.13
87.58 9566.78
92.7 9701.27
92.56 9868.57
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93.17 10295
                                        92.93 9530.7
91.86 9602.86
93.54 9776.72
                                                                91.08 9550.38
93.06 9615.98
 9471.65
                                                                                                                87.45
                                                                92.69 9832.48
92.9210022.74
92.6110275.32
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                                                                                                                92.17
9911.21
10153.95
                                        92.29 9989.94
92.8210212.99
                                                                                         95.0810439.33
 10327 8
                                        93.9610386.85
                                                                94.9210416.37
                                                                                                                94 63
                                        94.6910567.26
                                                                96.1110619.75
10485.26
                95.6610518.06
                                                                                         95.1110639.43
                                                                                                                95.28
                                        94.09 10744.4
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95.0511095.22
10652.55
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                                                                94.6110800.16
                                                                                        94.3410836.25
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87.0511657.16
                                                                                        95.6611581.72
86.8111696.52
11460 36
                94.93
                            11503
                                                                94.67 11552.2
                                                                                                                91 41
                88.7111644.04
                                                                87.6511673.56
11627.64
11726.04
                85.4411762.12
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                                                                                                                82.75
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64.2711964.28
76.911998.28
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74.8911991.72
11934.28
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                                                                                        82.91 12027.8
                                                                                                                93.35
11981.88
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92.9 12159
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12047.48
 12142.6
12300 04
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                                                                                         91 512424 68
                                                                                                                91.18
                                        93.3112506.68
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                                                                                        91.4612542.76
                                                                94.6712608.36
99.4412677.25
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                                                                                        94.59 12618.2
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101.7613133.17
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12965.89
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102.1313159.41
105.9813241.41
97.9613329.97
13064 29
                                                               101.2213149.57
                                                                104.113218.45
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13349.65
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13720.29
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94.5613756.37
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95.2513766.21
                96.7114172.93
95.2714366.45
                                                                                        97.1714327.09
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14153 25
                                        97 1414258 21
                                                                                                                96 69
                                                                97.414412.37
95.4114707.57
                                          96.514376.29
                96.5614582.93
95.3314851.89
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93.415009.33
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93.715035.57
                                                                                                                  93.1
14943.73
                                        94.6715170.05
93.17 15671.9
94.92 15934.3
96.316242.62
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93.0115563.66
                                                                94.7615209.41
93.55 15688.3
                                                                                        93.7915258.61
94.4915740.78
15101.17
15455.42
                                                                                                                94.43
                                                                95.4516045.82
95.9616288.54
                                                                                        95.02 16131.1
96.4816409.89
15760.46
                94.9815832.62
                95.67 16229.5
96.9516590.26
16495.16
                                        97.3716600.09
                                                                97.66 16662.4
                                                                                         97.5816714.87
                                                                                                                 97.9
                98.2916750.94
97.7916878.83
                                        97.9316800.13
97.3416885.39
                                                                                         93.6316842.76
16721.43
                                                                96.0216819.81
                                                                95.2116901.79
    16869
                                                                                         93.1516914.91
                                                                                                                92.79
16944.42
                                                                                        95.7817029.68
                93.0716996.89
                                        92.9917010.01
                                                                93.8417016.56
                                        103.817085.43 101.0817095.27
                                                                                      100.4617111.66
17046.08
              104.6817072.31
17226.44
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .09 11552.2 .06611817.88 .01511991.72
                                                                                      n Val Sta
.066 12027.8
Bank Sta: Left Right
                                       Lengths: Left Channel Right
                                                                                         Coeff Contr.
                                                                                                                Expan.
                                       881.09 1506.5 1723.2
1
         11552.212047.48
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
12047.4817226.44 94.25 T
                                     T
103.97
Elevation= 107.64
                                                        Elevation= 104.68
CROSS SECTION OUTPUT Profile #Design Flow
                                    103.53
   Vel Head (ft)
                                                         Wt. n-Val.
                                            0.05
                                                                                                 0.090
                                                                                                                 0.053
                                                                                                                                  0.102
                                                                                                                               1723 20
   W.S. Elev (ft)
Crit W.S. (ft)
                                         103.49
                                                        Reach Len. (ft)
Flow Area (sq ft)
                                                                                             881.09
89787.69
                                                                                                             1506.50
11705.43
   E.G. Slope (ft/ft)
Q Total (cfs)
                                  0.000176
                                                        Area (sq ft)
Flow (cfs)
                                                                                             89787.69
                                                                                                             11705.43
                                                                                                                              23507.52
                                      125000.00
                                                                                              77736.41
                                                        Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
   Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                      16850.21
                                                                                             11433.89
                                                                                                                495.28
                                                                                                                                4921.04
                                                                                              0.87
                                                                                                                   3.01
                                                                                                                  23.63
                                           40.22
                                                                                                                                    4 51
   Conv. Total (cfs)
Length Wtd. (ft)
                                      9416326.0
1175.09
                                                                                              5855931.0
                                                                                                                2654494.0
                                                                                                                                  905901.0
                                                                                             11436.09
                                                                                                                512.25
                                                                                              0.09
   Min Ch El (ft)
                                                                                                                 0.25
                                                         Shear (lb/sq ft)
Stream Power (lb/ft s)
                                          63.27
                                                                                                                                    0.05
   Alpha
   Frctn Loss (ft)
C & E Loss (ft)
                                                        Cum Volume (acre-ft)
                                            0 16
                                                                                            101345 10
                                                                                                               42006 24
                                                                                                                               133133 80
                                                        Cum SA (acres)
                                                                                                               1920.30
```

Warning: Divided flow computed for this cross-section.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 149.66*

| THINT | |
|-------|--|

| INPUT
Descriptio | n: PCV | -04 | | | | | | | |
|--------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------------|-----------------|
| Station El | evation | n Data | num= | 466 | | | | | _, |
| Sta
0 | Elev
93.32 | Sta
8.49 | Elev
91.15 | Sta
17.09 | Elev
93.04 | | Elev
96.38 | Sta
31.07 | Elev
98.95 |
| | 100.37 | 45.04 | 100.61 | 59 | 100.17 | 71.13 | 102.62 | 80.48 | 106.43 |
| 84.22 | 107.2
91.3 | 101.99 | 107.18 | 106.72 | 105.98 | | | 142.68
205.75 | 93.75 |
| 154.98
212.28 | 94.73 | 158.98
271.76 | 91.29
94.35 | 169.27
408.16 | 92.83
94.14 | | 94.68 | 545.25 | 94.27
94.28 |
| 624.05 | 94.07 | 786.22 | 94.15 | 896.93 | 94 | 969.89 | 93.95 | 1084.37 | 93.86 |
| 1134.51
1377.39 | 94.21 | 1162.9
1458.59 | 93.9
92.52 | 1178.67
1489.3 | | 1197.6
1509.79 | | 1342.54
1610.81 | 92.67
91.49 |
| 1837.92 | | 1888.39 | | 1904.16 | | 2008.13 | | 2027.18 | 91.74 |
| 2061.87 | 91.42 | 2117.35 | 91.35 | 2131 | 91.59 | 2165.13 | 91.53 | 2182.2 | 91.94 |
| 2199.26
2490.87 | | 2266.91
2500.34 | 91.4
92.9 | 2363.1
2516.1 | | 2404.06
2537.17 | 91.44
92.18 | 2453.02
2571.3 | 91.97
92.64 |
| 2605.43 | | 2625.91 | | 2642.98 | | 2656.63 | | 2677.11 | 93.52 |
| 2704.42 | | 2771.61 | | 2828.39 | | 2875.71 | | 2907.25 | 93.56 |
| 3079.86
3434.83 | | 3154.95
3497.13 | | 3284.65
3619.14 | | 3342.68
3690.82 | | 3393.88
3735.19 | 93.69
94.66 |
| 3762.5 | | 3786.38 | | 3878.54 | 93.55 | 3973.55 | | 4038.96 | 93.22 |
| 4093.43 | | 4213.12 | | 4348.99 | | 4380.48 | | 4462.57 | 93.69 |
| 4500.43
4891.64 | | 4619.56
4923.19 | | 4721.28
4967.37 | | 4768.6
5080.66 | | 4817.66
5114.81 | 93.89
93.75 |
| 5245.01 | 93.83 | 5319.74 | 93.75 | 5352.27 | 93.9 | 5422.21 | 93.75 | 5449.53 | 94.08 |
| 5463.19
5702.27 | 93.69 | 5507.6
5778.19 | | 5541.75
5811.58 | | 5592.98
5869.68 | | 5647.63
5893.54 | 93.81
93.08 |
| 5923.32 | | 5932.78 | | 5954.87 | | 5986.42 | | 5995.89 | 93.00 |
| 6011.66 | 90.07 | 6027.44 | 89.53 | 6087.38 | 89.59 | 6093.69 | 89.43 | 6169.41 | 89.34 |
| 6182.03
6469.13 | | 6245.13
6481.75 | 89.53 | 6295.6
6497.52 | | 6421.81
6510.14 | | 6437.58
6532.23 | 89.41
94.37 |
| 6595.33 | 94.25 | 6604.8 | | 6626.88 | | 6658.43 | | 6683.67 | 93.95 |
| 6768.85 | | 6803.56 | | 6822.49 | | | | 6967.62 | 94.28 |
| 7043.34
7251.57 | | 7096.97
7324.64 | | 7112.74
7380.92 | | 7147.45
7421.93 | | 7201.09
7437.71 | 93.48
92.41 |
| 7469.26 | 92.1 | 7488.18 | | 7544.98 | | 7587.63 | | 7608.12 | 94.11 |
| 7625.21 | | 7635.46 | | 7652.53 | | 7672.6895 | | | 95.45 |
| 7696.93
7792.56 | | 7707.17
7819.89 | | 7734.51
7857.46 | | 7761.83
7873.1 | | 7768.98
7885.72 | 91.21
89.55 |
| 7923.58 | 89.27 | 7980.37 | 89.39 | 8008.78 | 90.29 | 8040.33 | 90.46 | 8065.57 | 91.65 |
| 8096.55
8257.07 | | 8112.91
8299.07 | | 8160.23
8315.14 | | 8179.16
8366.37 | | 8229.75
8403.94 | 91.57
91.65 |
| 8431.26 | | 8448.34 | | 8468.83 | | | | 8497.86 | 94.4 |
| 8513.64 | | 8576.75 | | 8601.99 | | 8656.69 | | 8665.09 | 93.49 |
| 8684.03
8841.8 | | 8696.65
8882.11 | | 8709.27
8892.28 | | 8762.91
8923.09 | 89.25
90.26 | 8785
8942.77 | 89.01
89.49 |
| 8964.86 | | 9002.72 | | 9031.12 | | 9053.21 | | 9062.68 | 92.26 |
| 9087.03 | | 9114.36 | | 9144.72 | | | | 9185.73 | 90.67 |
| 9201.51
9326.11 | | 9214.13
9336.36 | | 9236.22
9352.97 | | 9271.47
9380.77 | | 9291.96
9404.67 | 94.03
95.43 |
| 9414.92 | 95.3 | 9428.58 | 93.3 | 9452.48 | 93.38 | 9466.15 | 93.95 | 9483.23 | 90.66 |
| 9490.06 | | 9517.38 | | 9541.29 | | 9572.02 | | 9602.77 | 89.67 |
| 9616.43
9787.2 | | 9660.83
9835.01 | | 9694.98
9862.35 | | 9712.06
9902 | | 9776.96
9944.31 | 89.84
90.38 |
| 9990.36 | 91.02 | 10018.75 | 91.091 | 10040.84 | 90.86 | 10084.34 | 91.583 | 10116.57 | 91.02 |
| 10163.9
10296.1 | | 10193.64
10313.18 | | L0233.32
L0398.57 | | 10245.94
10412.23 | | 10279.03
10449.8 | 91.44
92.85 |
| 10477.13 | | 10498.37 | | 10517.3 | | 10562.51 | | 10449.8 | 93.43 |
| 10630.9 | 93.61 | 10671.76 | 94.431 | 10684.29 | 94.16 | 10743.82 | 94.21 | 10793.94 | 93.9 |
| 10815.88 | | 10832.19
11009.21 | | L0862.82
L1033.04 | | 10917.29
11046.66 | | 10934.31
11082.94 | 94.47
93.75 |
| 11111.34 | | | | 11148.32 | | 11177.83 | | 11187.33 | 89.68 |
| 11201.17 | | 11237.19 | 87.041 | 1254.01 | 87.5 | 11263.31 | | 11277.56 | 84.67 |
| 11280.9484
11345.9768 | | | | 11303.68
11366.23 | | 11315.55
11409.21 | | 11322.79
11442.06 | 72.51
60.13 |
| 11446.18 | 60.74 | 11447.66 | 64.031 | 1455.75 | 66.93 | 11466.14 | | 11474.39 | 73.9 |
| 11488.09
11537.72 | | 11499.497 | | | | 11524.47
11568.32 | | 11532.21 | 93.97 |
| 11614.04 | | 11548.73
11643.43 | 95.28 | 1558.53
11676.94 | 93.07 | 11690.12 | | l1587.92
l1719.76 | 95.45
93.39 |
| 11744.67 | 92.543 | 11800.18 | | 1842.63 | 91.583 | 11894.33 | 92.183 | 11924.28 | 92.11 |
| 11950.33
12041.84 | | 11960.21
12067.96 | | 11983.06
12074.49 | | 12005.92
12116.95 | | 12032.04
12139.82 | 92.5
93.35 |
| 12156.13 | | 12162.67 | | 12175.74 | | 12192.06 | | 12227.98 | 93.93 |
| 12254.1 | | 12270.44 | | 12286.77 | | 12296.57 | | 12309.63 | 94.62 |
| 12342.29
12479.44 | | 12352.08
12499.04 | | L2414.13
L2515.36 | | 12431.23
12531.69 | | 12463.11
12561.08 | 97.94
99.22 |
| 12569.57 | 99.33 | 12629.66 | 99.07 | 12645.99 | 99.55 | 12655.79 | 99.15 | 12671.68 | 100.09 |
| 12691.43
12783.14 | | 12714.57
12799.47 | | 12825.6 | | 12750.49
12845.19 | | 12763.55
12851.72 | 101.54
99.09 |
| 12877.85 | | 12907.24 | | 12920.3 | | 12956.22 | | 12985.61 | 95.7 |
| 13008.47 | 95.93 | 13041.13 | 95.491 | 13060.72 | 95.85 | 13090.11 | 95.843 | 13099.91 | 95.53 |
| 13159.15
13517.91 | | 13175.62
13570.88 | | 13214.21
13623.58 | | 13259.92
13664.86 | | 13406.19
13705.93 | 95.79
95.91 |
| 13719.1 | | 13738.86 | | 13782.42 | | 13818.35 | | 13828.14 | 95.4 |
| 13867.33 | | 13942.44 | | 3962.03 | | 14025.43 | | 14038.6 | 95.61 |
| 14137.41
14376.77 | | 14197.16
14406.16 | | 14282.06
14432.28 | | 14298.39
14487.8 | | 14340.84
14497.59 | 94.81
95.56 |
| 14504.12 | | 14523.72 | | 14568.9 | | 14591.96 | | 14605.13 | 94.93 |
| 14634.75 | | 14657.61 | | 14745.78 | | 15033.33 | | 15059.68 | 93.74 |
| 15157.26
15422 | | 15173.59
15494.46 | | 15225.84
15520.81 | | 15245.43
15589.98 | | 15317.28
15626.21 | 94.13
94.36 |
| 15686.29 | 94.39 | 15712.42 | 94.741 | 15725.48 | 94.59 | 15777.72 | 94.92 | 15929.24 | 94.95 |
| 15962.18
16202.19 | | 16051.12
16231.57 | | 16084.05 | | 16143.42 | | 16189.46 | 95.26
93.45 |
| 16202.19 | | 16358.9 | | L6280.54
L6365.43 | | 16300.14
16381.76 | | 16322.99
16429.9 | 93.45 |
| 16449.66 | 93.35 | 16456.25 | 92.93 | 16466.13 | 93.6 | 16482.6 | 93.43 | 16496.03 | 95.61 |
| 16509.09
16615.59 | 96.651
97.76 | 16525.41 | 101.87 | 16538.53 | 101.43 | 16550.01 | 99.76 | 16558.21 | 97.76 |
| | 20 | | | | | | | | |
| Manning's | | | num= | 6 | n 17-7 | 0+- | n 17-7 | ar. | n 17-7 |
| Sta
0 | n Val | Sta
7635.46 | n Val | Sta
11111.34 | n Val
.066 | Sta
11201.17 | n Val
.0151 | Sta
11488.09 | n Val
.066 |
| 11548.73 | .102 | | | | | | | | |
| Bank Sta: | Left | Right | Length | : Left | Channel | Right | Coef | E Contr. | Expan |
| | | | | | | | | | |
| | | | | | | | | | |

```
11111.3411548.73 881.09 1506.5 1723.2

Ineffective Flow num= 2

Sta L Sta R Elev Permanent
011111.34 94.43 T

11548.7316615.59 95.28 T

Left Levee Station= 84.22 Elevation= 107.2
Right Levee Station=16525.41 Elevation= 101.86

Blocked Obstructions num= 2

Sta L Sta R Elev Sta L Sta R Elev
5948.36 6506.02 94.23 7672.9810667.81 93.66
  CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 149

| INPUT
Descripti | | | | left with | | | | | ons |
|----------------------|---------------|----------------------|----------------|----------------------|----------------|----------------------|---------------|----------------------|----------------|
| Station E | | | num= | 462 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 93.92 | 19 | 95.1 | 25 | 98.41 | 31 | 100.34 | 55 | 100.17 |
| 67 | 102.32 | 77 | 106.4 | 81 | 107.08 | 100 | 106.72 | 132 | 95.45 |
| 144
200 | 92.2
93.84 | 150
206.99 | 91.44
94.84 | 161
236.99 | 93.57
94.84 | 173
257.99 | 94.26
94.5 | 193
416.99 | 94.63
94.15 |
| 495.99 | 94.31 | 562.98 | 94.84 | 615.98 | 94.84 | 699.98 | 94.11 | 848.98 | 94.15 |
| 886.98 | 94.17 | 938.98 | 93.85 | 987.98 | | 1016.98 | | 1081.98 | 93.95 |
| 1150.64 | | 1163.75 | | 1239.15 | | 1248.98 | | 1288.32 | 93.91 |
| 1324.38 | | 1380.11 | | 1399.78 | | 1412.89 | | 1429.28 | 94.24 |
| 1442.39 | | 1448.95 | | 1504.68 | | 1560.41 | | 1645.64 | 91.51 |
| 1678.42 | | 1871.84 | | 1927.57 | | 1957.07 | | 2032.47 | 91.22 |
| 2045.58 | | 2078.36 | | 2094.75 | | 2104.59 | | 2111.14 | 91.63 |
| 2137.37
2379.94 | | 2248.82
2435.67 | | 2268.49
2468.45 | | 2307.83
2478.29 | | 2347.16
2501.23 | 92.02
92.03 |
| 2520.9 | | 2537.29 | 98.91 | 2550.4 | | 2570.07 | 93.56 | 2596.3 | 92.9 |
| 2612.69 | | 2648.75 | | 2720.86 | | 2747.09 | | 2868.38 | 93.73 |
| 2956.88 | 93.71 | 3029 | | 3153.57 | 93.69 | 3209.3 | | 3258.47 | 93.9 |
| 3297.8 | | 3337.14 | 94.14 | 3373.2 | 94.28 | 3432.2 | | 3448.59 | 95.69 |
| 3474.82 | | 3497.77 | | 3543.66 | | 3560.05 | | 3586.27 | 95.54 |
| 3612.5 | | 3628.89
3878.02 | | 3635.44
4028.88 | | 3668.22 | | 3723.95
4137.13 | 93.31 |
| 3792.79
4206.02 | | 4248.67 | | 4271.63 | | 4045.29
4343.79 | | 4406.12 | 93.03
92.9 |
| 4435.64 | | 4530.77 | 93.01 | 4625.9 | | 4652.14 | | 4878.49 | 93.44 |
| 4911.29 | | 4947.37 | | 5108.11 | | 5131.07 | | 5196.68 | 93.44 |
| 5206.52 | | 5232.76 | 93.99 | 5245.88 | 93.23 | 5255.72 | 94.4 | 5262.28 | 93.93 |
| 5288.53 | | 5308.21 | | 5321.33 | | 5370.53 | | 5423.02 | 93.69 |
| 5475.5 | | 5495.19 | | 5580.48 | | 5603.44 | | 5652.64 | 93.47 |
| 5659.2 | | 5678.88 | | 5701.85 | | 5780.57 | 93.28 | 5826.5
6462.88 | 93.5 |
| 5954.43
6495.68 | 93.2 | 6092.2
6554.73 | | 6252.94
6590.81 | | 6387.43
6754.83 | | 6830.28 | 92.89
92.77 |
| 6915.56 | | 6991.01 | | 7033.66 | | 7115.66 | | 7223.92 | 92.92 |
| 7243.6 | | 7266.56 | | 7286.24 | | 7305.92 | | 7322.33 | 97.6 |
| 7332.17 | 97.49 | 7348.57 | | 7368.25 | | 7378.09 | | 7391.21 | 93.78 |
| 7401.05 | 92.54 | 7427.3 | 92.07 | 7443.7 | | 7453.54 | 88.55 | 7476.5 | 87.86 |
| 7483.06 | 87.12 | 7509.3 | | 7525.71 | | 7545.39 | 85.44 | 7627.4 | 85.8 |
| 7666.76 | | 7686.44 | 86.37 | | 86.39 | | | 7775.01
7873.42 | 87.79 |
| 7784.85
7902.94 | | 7804.53
7919.34 | 88.89
88 14 | 7827.49
7929.18 | 88.11 | 7860.3
7952.15 | | 7984.95 | 88.54
88.44 |
| 8001.35 | | 8034.15 | | 8070.24 | | 8083.36 | | 8096.48 | 89.92 |
| 8112.88 | | 8132.56 | | 8145.69 | | 8175.21 | | 8204.73 | 91.9 |
| 8247.38 | | 8273.62 | | 8290.02 | | 8312.98 | | 8329.38 | 93.65 |
| 8339.22 | | 8349.06 | | 8365.46 | | 8378.59 | | 8417.95 | 91.51 |
| 8460.59 | | 8470.43 | | 8513.08 | | 8529.48 | | 8549.16 | 93.09 |
| 8559
8709.89 | | 8568.84
8726.29 | 93.98 | 8591.8
8752.54 | | 8601.64
8768.94 | | 8660.69
8805.02 | 93.05
94.15 |
| 8834.54 | | 8850.95 | | 8860.79 | | 8877.19 | | 8903.43 | 94.13 |
| 8923.11 | | 8955.91 | | 8965.75 | | 8995.28 | 94.54 | 9008.4 | 95.32 |
| 9031.36 | 98.18 | 9041.2 | | 9054.32 | | 9077.28 | | 9090.41 | 95.44 |
| 9106.81 | | 9113.37 | | 9139.61 | | 9162.57 | | 9192.09 | 85.97 |
| 9221.62 | | 9234.74 | | 9277.38 | | 9303.62 | | 9310.18 | 86.42 |
| 9326.58 | | 9336.43 | | 9369.23 | | 9388.91 | | 9398.75 | 87.51 |
| 9444.67
9549.64 | | 9470.92
9566.04 | | 9480.76
9654.61 | | 9503.72
9684.13 | | 9536.52
9720.22 | 87.34
87.32 |
| 9746.46 | | 9775.98 | 89.84 | 9789.1 | | 9808.79 | | 9825.19 | 91.08 |
| 9871.11 | | 9887.51 | | 9903.91 | | 9917.03 | | 9946.56 | 89.31 |
| 9966.24 | 90.13 | 9985.92 | 90.43 | 9999.04 | 92.18 | 10018.72 | 92.04 | 10035.12 | 90.81 |
| 10048.25 | | 10061.37 | | 10100.73 | | 10123.69 | | 10143.37 | 91.95 |
| 10189.3 | | 10235.22 | | 10271.3 | | 10327.07 | | 10350.03 | 91.91 |
| 10402.38 | | 10431.8 | | 10461.23 | | 10484.11 | | 10500.46 | 93.47 |
| 10510.27
10608.36 | | L0536.43
L0627.97 | | L0559.31
L0634.51 | | 10572.39
10670.48 | | 10595.28 | 91.18
92.01 |
| 10693.36 | | 10716.25 | | 10726.06 | | 10739.14 | | 10758.75 | 89.06 |
| 10768.56 | | 10778.37 | | 10794.72 | | 10807.82 | 78.42 | 10817.63 | 72.15 |
| 10824.18 | | 10828.18 | | 10840.18 | | 10852.18 | | 10865.18 | 55.9 |
| 10879.18 | | 10890.18 | 56.13 | 10901.18 | | 10913.18 | | 10923.18 | 55.8 |
| 10931.18 | | 10951.81 | | 10961.62 | | 10964.9 | | 10974.71 | 74.94 |
| 10991.08
11066.34 | | L1000.89
L1099.07 | | L1030.34
L1167.79 | | 11036.89 | | 11049.98
11190.75 | 96.3 |
| 11220.26 | | 11253.05 | | 11282.57 | | 11177.63
11394.06 | | 11407.18 | 94.73
92.88 |
| 11449.81 | | 11459.65 | | 11489.16 | | 11531.79 | | 11564.59 | 93.46 |
| 11580.98 | | 1607.22 | | 11630.17 | 91.13 | 11643.29 | | 11682.64 | 91.33 |
| 11708.88 | | 11738.39 | | L1777.74 | | 11797.42 | | 11840.05 | 96.66 |
| 11869.56 | | 11922.03 | | L1928.59 | | 11971.22 | | 12020.41 | 95.88 |
| 12036.81 | | 12046.64 | | 12066.32 | 96.98 | 12086 | | 12154.86 | 96.99 |
| 12167.98
12256.52 | | L2187.65
L2286.03 | | L2210.61
L2345.06 | | 12230.28
12364.74 | | 12243.4
12495.91 | 97
96.4 |
| 12545.1 | | 12620.52 | | 12653.31 | | 12669.71 | | 12676.27 | 96.31 |
| 12682.83 | | 12718.9 | | 12761.53 | | 12804.16 | | 12899.26 | 96.05 |
| 12932.05 | | 12955.01 | | 13033.71 | | 13063.23 | | 13115.69 | 95.58 |
| 13125.53 | 95.711 | 13181.28 | 95.57 | L3197.68 | 94.91 | 13210.79 | 96.13 | 13230.47 | 95.07 |
| 13240.31 | | 13315.73 | | 13361.64 | | 13404.27 | | 13515.77 | 95.36 |
| 13528.89 | | 13597.75 | | 13627.26 | | 13679.73 | | 14022 0 | 95.33 |
| 13873.21
14056.85 | | L3902.73
L4079.81 | | L3965.03
L4086.37 | | 13987.99
14092.92 | | 14033.9
14119.16 | 95.61
96.07 |
| 14151.95 | | L4079.81
L4184.75 | | L4086.37 | | 14332.31 | | 14335.59 | 95.24 |
| 14388.06 | | 14420.85 | | L4456.93 | | 14496.28 | | 14519.23 | 94.17 |
| 14545.47 | | 14594.66 | | 14617.61 | | 14656.96 | | 14729.11 | 93.64 |
| 14817.65 | 93.281 | 14837.33 | 93.47 | L4866.84 | 93.23 | 14906.19 | 93.42 | 14978.33 | 92.95 |
| 15004.57 | | 15050.48 | | 15073.43 | | 15109.51 | | 15145.58 | 93.06 |
| 15260.35 | | 15355.45 | | 15381.69 | | 15411.2 | 93.01 | 15444 | 92.75 |
| 15483.35 | 24.15 | 15532.54 | 24.33. | 15565.33 | 24.19 | 15670.27 | JZ.00. | 15683.38 | 92.82 |

93.4715971.96 95.18

```
Manning's n Values
                                                                           Sta n Val Sta
58.25 .1210670.48
                                                                                                                                                             n Val
                 Sta n Val Sta
0 .066 7368.25
                                                                                                                                                                                                     Sta
                                                                                                                                                                                                                          n Val
                                                                                                                                                                      .0710817.63
                                                                                                                                                                                                                                .02510931.18
11049.98
                                          .066
                                                                     ight Lengths: Left Channel Right
9.98 1249.78 1505.93 1342.39
num= 2
Elev Permanent
93.21 T
96.3 T
Bank Sta: Left Right
10670.4811049.98
Ineffective Flow nu
Sta L Sta R Ele
                                                                                                                                                                                                                               Coeff Contr. Expan.
                                                                                                                                                                                                                                                           . 1
                         010670.48
                                                                                                  T
T
81
 11049.9816004.75
Left Levee Station= 81
Right Levee Station=16004.75
                                                                                                                                             Elevation= 107.08
| Star | 
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                                                              Element
                                                                                                                                                                                                                                                                                    Channel
                                                                                                                                                                                                                                                                                                                             Right OB
       Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                                             Wt. n-Val.
Reach Len. (ft)
                                                                                                              0.02
                                                                                                                                                                                                                                                   0.074
                                                                                                                                                                                                                                                                                           0.058
                                                                                                                                                                                                                                                                                                                                     0.066
                                                                                                                                                                                                                                       1249.78
94504.57
                                                                                                                                             Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
                                                                                                             87.32
                                                                                                                                                                                                                                                                               10359.21
                                                                                                                                                                                                                                                                                                                          33948.05
                                                                                0.000090
125000.00
15894.81
       E.G. Slope (ft/ft)
Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                                                                                                                                                       100657.60 10359.21
77168.42 21759.79
                                                                                                                                                                                                                                                                                                                             42128.14
26071.79
                                                                                               125000.00
                                                                                                                                           Flow (crs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                                                                                                                      10560.54
                                                                                                                                                                                                                                                                                        379.50
                                                                                                                                                                                                                                                                                                                              4954.77
                                                                                                                                                                                                                                  0.82
                                                                                                               0.90
                                                                                                                                                                                                                                                                                               2.10
                                                                                                                                                                                                                                                                                                                                         0.77
       Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                                                                                                                                                                                                                          27.30
                                                                                                             47.62
                                                                                                                                                                                                                                                                                                                                         6.85
                                                                                                                                                                                                                                     10570.67
                                                                                                                                                                                                                                                                                                                             4960.63
                                                                                                1367.15
                                                                                                                                                                                                                                                                                     405.12
                                                                                                                                             Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                                                                                                       0.05
                                                                                                                                                                                                                                                                                              0.14
                                                                                                             55.60
       Alpha
                                                                                                               1.61
                                                                                                                                                                                                                                                                                                                                          0.03
       Frctn Loss (ft)
C & E Loss (ft)
                                                                                                                                       Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                                                                                                                                                     97253.73
14254.77
                                                                                                                                                                                                                                                                            41256.93
1890.04
                                                                                                               0 09
                                                                                                                                                                                                                                                                                                                          130227 60
                                                                                                               0.03
                                                                                                                                                                                                                                                                                                                      16097.55
```

93.1315876.86

93.2115840.79 93.1315876.86 92.7715945.73 94.1915962.12

Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

TNPIIT

15929.33

93.6715935.89

RIVER: Rio Grande REACH: Lower Reach RS: 148.34*

| INPUT | | | | | | | | | |
|--------------------|-----------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|----------------|
| | ion: RGV- | | | | | | | | |
| | Elevation | | num= | 465 | | | | | |
| Sta | | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 94.57 | 14.6 | 97.34 | 27.94 | 100.37 | 42.68 | 100.11 | 49.57 | 100.55 |
| 60.38 | | 73 | 107.06 | 88.99 | 106.68 | 92 | 106.19 | 124 | 95.34 |
| 133.99 | 92.26 | 142 | 91.1 | 161.23 | 94.16 | 184.47 | 94.39 | 198.29 | 94.46 |
| 227.93 | | 345.48 | 94.16 | 473.04 | 94.24 | 480.12 | 93.76 | 488.22 | 94.25 |
| 513.52 | | 553.01 | 94.07 | 655.26 | 93.93 | 715.99 | 94.02 | 796.99 | 94 |
| 837.48 | | 870.02 | 93.75 | 921.39 | 93.65 | 998.44 | | 1071.94 | 93.83 |
| 1091.97 | | 1126.25 | | 1161.18 | | 1223.39 | 93.79 | 1249.1 | 94.16 |
| 1266.24 | | 1288.15 | | 1484.38 | | 1534.41 | | 1561.34 | 92.63 |
| 1611.37 | | 1709.07 | | 1774.78 | 92.42 | 1786.2 | | 1814.77 | 92.45
92.34 |
| 1829.06 | | 1866.2 | | 1903.79 | | 1949.96 | | 2014.76 | |
| 2049.03 | | 2126.17 | | 2154.74 | 92.74 | 2183.3 | | 2200.45 | 94.77 |
| 2214.73 | | 2226.15 | 95.74 | 2243.3 | | 2280.44 | 93.23 | 2315.5 | 93.46
92.1 |
| 2374.71
2584.84 | | 2438.63
2627.17 | | 2488.65
2646.41 | | 2503.27
2704.12 | | 2542.52
2719.52 | 92.75 |
| 2746.45 | | 2784.92 | | 2815.71 | | 2854.19 | | 2865.73 | 92.75 |
| 2877.27 | 92.65 | 2911.8 | | 2977.31 | | 2988.85 | 92.92 | 3008.1 | 93.73 |
| 3046.57 | | 3085.04 | | 3106.07 | | 3131.22 | | 3181.24 | 92.9 |
| 3227.42 | | 3339 | | 3383.18 | | 3446.73 | | 3514.65 | 92.22 |
| 3554.47 | | 3608.99 | | 3662.21 | 92.26 | 3706.2 | | 3843.42 | 92.37 |
| 3869.14 | | 3952.05 | | 4034.95 | | 4057.82 | | 4143.17 | 92.5 |
| 4185.49 | | 4255.09 | | 4283.67 | 92.56 | 4455.2 | | 4474.07 | 92.8 |
| 4540.97 | | 4563.83 | | 4575.27 | | 4612.44 | | 4641.02 | 93.05 |
| 4683.9 | | 4729.65 | | 4775.38 | | 4866.87 | | 4952.63 | 92.85 |
| 5041.25 | | 5082.01 | | 5192.77 | | 5282.08 | | 5324.41 | 92.76 |
| 5432.13 | | 5497.55 | | 5528.33 | 92.78 | 5635.88 | | 5664.47 | 92.86 |
| 5715.93 | | 5747.38 | | 5890.01 | | 5956.07 | | 6036.21 | 92.79 |
| 6096.15 | | 6133.32 | | 6204.78 | | 6336.29 | | 6353.44 | 92.47 |
| 6370.59 | | 6384.9 | | 6393.47 | | 6407.76 | | 6423.849 | |
| 6433.49 | | 6444.92 | 93.45 | 6453.5 | | 6476.38 | | 6490.23 | 92.26 |
| 6497.92 | | 6501.77 | | 6524.97 | 90.35 | 6547.84 | | 6579.29 | 89.5 |
| 6605.66 | | 6650.76 | | 6685.07 | 89.47 | | | 6725.09 | 89.99 |
| 6759.4 | | 6779.41 | | 6805.13 | | 6825.14 | | 6853.74 | 90.73 |
| 6865.17 | 90.94 | 6890.9 | 90.49 | 6913.77 | 91.01 | 6933.78 | 90.86 | 6948.08 | 90.44 |
| 6976.66 | 90.48 | 7005.25 | 89.76 | 7036.7 | 89.8 | 7059.57 | 90.91 | 7073.86 | 91.08 |
| 7091.01 | 91.86 | 7102.45 | 91.36 | 7153.91 | 91.64 | 7228.24 | 91.57 | 7248.25 | 91.97 |
| 7271.12 | 93.27 | 7279.69 | 93.02 | 7293.98 | 91.89 | 7355.93 | 91.39 | 7386.71 | 91.68 |
| 7422.63 | 91.65 | 7436.93 | 91.82 | 7462.65 | 92.91 | 7491.24 | 92.64 | 7536.76 | 92.96 |
| 7551.28 | 92.83 | 7594.15 | 92.89 | 7608.45 | 92.55 | 7631.32 | 92.92 | 7645.62 | 92.69 |
| 7677.06 | 92.84 | 7702.79 | | 7725.66 | 92.45 | 7739.96 | 92.92 | 7762.82 | 92.71 |
| 7779.98 | | 7808.56 | | 7817.14 | 93.18 | 7842.87 | | 7854.31 | 93.4 |
| 7874.32 | | 7882.89 | | 7894.33 | 92.71 | 7914.33 | | 7925.78 | 93.43 |
| 7940.07 | | 7945.79 | | 7968.66 | 88.47 | | | 8014.39 | 88.6 |
| 8040.13 | | 8051.56 | | 8088.72 | | 8117.31 | 88.81 | 8131.6 | 89.28 |
| 8234.52 | | 8257.39 | | 8285.98 | | 8314.56 | | 8340.29 | 89.18 |
| 8417.48 | | 8448.65 | | 8474.66 | | 8497.53 | | 8534.69 | 91.09 |
| 8551.85 | | 8566.14 | | 8606.16 | 89.85 | 8620.45 | | 8648.72 | 89.74 |
| 8689.06 | | 8706.21 | | 8717.65 | 91.64 | 8734.8 | | 8749.09 | 90.94 |
| 8771.97 | | 8806.27 | | 8843.43 | | 8883.46 | | 8906.51 | 91.74 |
| 8954.92 | | 9003.53 | | 9023.54 | | | 91.99 | 9094.8 | 92.67 |
| 9120.45 | | 9140.39 | | 9154.64 | | 9179.69 | | 9205.92 | 91.34 |
| 9237.27 | | 9248.67 | | 9264.34 | | 9283.57 | | 9302.81 | 94.36 |
| 9318.71 | | 9334.62 | | 9345.2986 | | | | 9364.15 | 83.79 |
| 9370.96 | | 9377.78 | | 9396.37 | | 9405.06 | | 9409.62 | 67.12 |
| 9412.39 | | 9418.39 | 58.82 | 9452.9 | 60.95 | 9459.8 | 60.61 | 9487.4 | 61.47 |
| 9493.61 | | 9525.38 | | 9543.48 | | 9559.33 | | 9566.12 | 67.47 |
| 9583.59 | 81.19987 | 9591.02 | | 9609.13
9656.66 | 72.87 | 9622.71
9667.98 | | 9636.29
9674.77 | 79.1
77.11 |
| 9643.84 | | 9706.46 | | 9656.66 | | 9667.98 | 88.35 | 9674.77 | 92.45 |
| 2022.07 | 17.44 | J/00.40 | 01.70 | 2121.33 | 07.48 | J174.01 | 00.35 | 2103.0 | JZ.43 |
| | | | | | | | | | |

```
94.51 9844.28
93.68 9940.38
91.8510097.58
                                                                                      94.69 9852.72
93.83 9959.68
91.9310122.91
                94.45 9799.25
95.08 9892.13
                                         95 9827.4
94.5 9903.38
9872.43
10004.71
                                                                                                              94.33
91.58
                                                               91.3810243.93
10142.62
                92.2210196.09
                                         91.4 10218.6
                                                                                       90.5810269.27
                                                                                                              90.68
10280.52
                91.3810305.85
                                       91.3910322.74
                                                               91.1210356.51
                                                                                       91.4210387.47
10435.37
                90.7610460.65
                                       90.79 10494.3
                                                               89.7810510.02
                                                                                       89.6110557.16
                                                                                                              90.12
10588.59
10809.64
                                                                                      90.2310745.73
91.27 10978.5
                89.1710623.95
                                        88.9810671.09
                91.3110823.71
                                       91.5610891.26
                                                               91.5210955.99
11012.28
                91.4511057.31
                                       90.4911091.09
90.3711167.07
                                                                90.211107.97
                                                                                       90.7111116.41
                                                                                                              90.42
                                       96.1211223.36
96.39 11327.5
95.9411431.63
                                                               96.6511248.69
96.78 11347.2
96.1811507.62
                                                                                      95.8811259.95
96.7511358.45
95.9111558.28
11195.22
                95.8211213.22
                                                                                                              96.11
11276.84
11378.16
                96.2311403.49
                                                                                                              96.01
                                                               95.6411682.12
95.8611755.36
11594 87
                95.82 11620.2
                                       95.8811653.98
                                                                                       95.85
                                                                                                  11699
11719.99
                95.4911739.64
                                         96.3 11747.5
                                                                                       96.2211865.05
                                                                                                              96.25
11887.57
               96.611904.46
96.3612011.41
                                       96.4411941.05
96.0112031.11
                                                              96.611969.19
96.1212059.25
                                                                                      96.3911980.45
95.7712078.96
12000.15
                95.8 12126.8
95.1712270.34
                                       95.9312143.69
95.3912323.81
                                                                                      95.5512214.05
12101.47
                                                                95.612191.53
                                                                                                              95.82
                                                                                      95.212372.13
94.7212568.55
                                       94.77 12423.2
94.35 12753.2
95.4312851.41
12387.84
                95.3612411.42
                                                               95.0312523.64
12667.18
12827.6
                94.2612700.95
94.7912841.67
                                                              94.1912779.75
95.0212900.78
                                                                                      94.5612802.26
95.1912954.25
                                                                                                              94.53
13007.72
13170.96
                95.4613047.13
94.9913213.18
                                         95.3 13100.6
95.213249.76
                                                               95.413114.67
95.13 13318.9
                                                                                      95.6213142.82
95.39 13373.9
                95.48 13428.9
95.8113590.31
                                       95.0413436.76
94.7113612.83
13407.38
                                                               95.66 13452.4
                                                                                       95.3313517.14
                                                                                                              95.34
                                                                                      94.51 13686
95.4413837.46
94.714073.17
93.8914371.74
                                                               94.7713663.49
95.24 13781.7
13702.89
                95.5513731.39
                                         95.513747.93
                                                                                                              95.42
13897.09
14120.31
                95.2413955.31
94.4114220.75
                                       94.8613986.75
94.3 14248.9
                                                               94.9214026.55
                                                                94.114336.39
                                       93.1214536.74
92.9414772.38
14418 88
                93.64 14505.3
                                                               93.3114591.74
                                                                                       93.1114619.23
                                                                                                                92 9
                93.1314705.66
                                                               93.0714907.48
14662.45
                                                                                       93.1114988.52
                                                                                                              92.95
                                                               93.6615231.14
93.1815439.41
15098.86
                 93.215208.62
                                       93.2115222.69
                                                                                       93.0715253.66
                                                                                                              93.31
                                                                                       93.7815678.64
15621.01
                 93.215644.57
                                       93.5215652.43
                                                               93.0715664.22
15684.27
               92.8815701.16
                                         94.415712.41
                                                               96.2715718.04
                                                                                       98.1815734.92
Manning's n Values num=

Sta n Val Sta n Val Sta

^ 105 9302.81 .066 9364.15
                                                             n Val Sta
.015 9799.25
                                                                                        .06611223.36
                                                                                                                .095
                                     Lengths: Left Channel Right
1249.78 1505.93 1342.39
73 Elevation= 107.06
5734.92 Elevation= 99.875
Bank Sta: Left
          a: Left Right 9302.81 9799.25
                                                                                        Coeff Contr.
                                                                                                              Expan.
Left Levee Station= 73
Right Levee Station=15734.92
| Sta L | Sta R | Elev | Sta L | Sta R | 0 | 9280.55 | 94.37 | 9794.61 | 11235.8
                                                                Elev
                                                                         Sta L
                                                                                                    Elev
                                                            94.9511941.05
CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 147 68

INPUT

Description: RGV-04, Updated on left with new survey to Station 1061.90. Bathymetric elevations translated from IBWC 2008 Cross-sections

| | | | | | slated fr | rom IBWC | 2008 Cr | oss-sect: | Lons |
|--------------------|--------|-------------------|--------|--------------------|-----------|-------------------|---------|--------------------|----------------|
| Station H | | | num= | 451 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | | Elev |
| 0 | 95.23 | 13 | 99.75 | 22 | 100.49 | 38 | 100 | | 101.98 |
| 65 | 107.03 | 80.99 | 106.58 | 100.99 | 100.43 | 125.99 | 91.78 | | 90.76 |
| 144.99 | 91.77 | 152.99 | 94.26 | 193.98 | 94.05 | 256.98 | 94.29 | | 94.03 |
| 371.97 | 94.19 | 460.96 | 94.2 | 463.96 | 95.31 | 467.96 | 93.21 | | 95.14 |
| 475.96 | 94.19 | 500.95 | 94.28 | 539.95 | 93.88 | 620.94 | 93.91 | | 93.79 |
| 700.93 | 93.93 | 780.93 | 93.9 | 820.92 | 93.24 | 979.91 | 93.66 | | 93.72 |
| 1082.53 | | 1102.21 | | 1161.26 | | 1184.22 | | 1253.11 | 93.72 |
| 1269.51 | | 1312.16 | | 1335.12 | | 1377.77 | | 1433.53 | 93.67 |
| 1489.3 | | 1528.67 | | 1577.87 | | 1627.08 | | 1666.44 | 93.61 |
| 1712.37 | 93.28 | 1807.5 | | 1876.39 | | 1912.48 | 93.31 | | 93.62 |
| 1978.08 | | 2053.53 | | 2083.06 | 92.55 | 2109.3 | 91.02 | | 90.44 |
| 2138.82 | | 2171.63 | | 2207.71 | 91.09 | 2243.8 | 90.8 | | 91.1 |
| 2309.4 | | 2322.53 | | 2345.49 | | 2378.29 | | 2404.54 | 91.11 |
| 2437.34 | | 2447.18 | | 2457.02 | | 2525.91 | | 2542.31 | 91.54 |
| 2552.15 | | 2568.56 | | 2601.36 | | 2634.16 | | 2673.53 | 94.32 |
| 2699.77 | | 2716.17 | | 2755.54 | | 2768.66 | | 2824.43 | 91.6 |
| 2850.67 | | 2942.52 | | 3034.37 | | 3126.22 | | 3175.43 | 92.02 |
| 3204.95 | | 3290.24 | | 3359.13 | | 3421.46 | | 3536.27 | 91.75 |
| 3572.35 | | 3683.89 | | 3818.38 | | 3870.87 | | 3939.76 | 92.13 |
| 4005.37 | | 4028.33 | | 4107.06 | | 4159.54 | | 4238.27 | 92.03 |
| 4336.68 | | 4484.29 | | 4507.25 | | 4543.34 | | 4635.18 | 92.52 |
| 4690.95 | | 4717.19 | | 4792.64 | | 4841.84 | | 4861.52 | 92.51 |
| 5025.54 | | 5058.34 | | 5123.94 | | 5150.19 | | 5169.87 | 92.95 |
| 5268.28 | | 5337.16 | | 5343.72 | 92.94 | 5399.49
5547.1 | | 5471.65
5553.66 | 92.74
93.63 |
| 5517.58
5589.74 | | 5537.26
5596.3 | | 5543.82 | | 5688.15 | | 5707.83 | 93.63 |
| 5734.07 | 93.49 | 5789.84 | | 5635.67
5799.68 | | 5865.29 | | 5917.77 | 92.62 |
| 5927.61 | | 5947.29 | | 5976.81 | | 6019.46 | | 6088.34 | 91.41 |
| 6160.51 | | 6199.87 | | 6216.27 | 90.93 | 6245.8 | | 6275.32 | 91.41 |
| 6301.56 | | 6337.65 | | 6377.01 | | 6390.13 | | 6429.49 | 92.87 |
| 6468.86 | | 6550.86 | | 6600.07 | | 6629.59 | | 6665.67 | 91.24 |
| 6691.91 | | 6764.08 | | 6855.93 | | 6878.89 | | 6921.53 | 91.24 |
| 6980.58 | | 7013.38 | | 7078.99 | | 7197.08 | | 7206.92 | 91.26 |
| 7243 | 91.08 | 7275.8 | | 7321.73 | | 7367.65 | | 7377.49 | 90.88 |
| 7410.29 | | 7495.58 | | 7518.54 | | 7597.27 | | 7613.67 | 90.94 |
| 7649.75 | | 7685.84 | 90.98 | 7692.4 | 91.14 | 7774.4 | | 7823.61 | 92.44 |
| 7830.17 | | 7849.85 | | 7866.25 | | 7885.93 | | 7902.34 | 91.26 |
| 7918.74 | | 7935.14 | | 7938.42 | | 7948.26 | | 7971.22 | 77.75 |
| 7981.06 | | 7987.62 | | 7996.61 | | 8006.61 | | 8016.61 | 63.84 |
| 8026.61 | | 8046.61 | | 8056.61 | | 8066.61 | | 8076.61 | 66.54 |
| 8096.61 | | 8105.61 | | 8125.39 | | 8135.23 | | 8151.64 | 74.02 |
| 8177.88 | 81.59 | 8191 | | 8200.84 | | 8210.68 | | 8220.52 | 79.29 |
| 8246.76 | | 8273.01 | | 8289.41 | | 8292.69 | | 8305.81 | 85.85 |
| 8312.37 | | 8322.21 | | 8328.77 | | 8341.89 | | 8358.29 | 78.94 |
| 8368.13 | | 8404.22 | | 8414.06 | 86.75 | 8423.9 | | 8433.74 | 89.07 |
| 8450.13 | | 8466.53 | | 8502.61 | | 8522.28 | | 8548.52 | 93.69 |
| 8581.32 | | 8600.99 | | 8610.83 | | 8633.79 | | 8656.75 | 93.19 |
| 8669.86 | | 8686.26 | | 8719.06 | | 8735.46 | | 8751.85 | 92.79 |
| 8761.69 | 92.8 | 8774.81 | | 8787.93 | | 8797.77 | | 8817.44 | 90.04 |
| 8833.84 | 90.61 | 8856.8 | | 8896.15 | | 8925.67 | | 8948.63 | 91.21 |
| 8968.3 | | 8978.14 | | 9010.94 | | 9037.17 | | 9050.29 | 88.77 |
| 9066.69 | 88.15 | 9096.21 | 88.14 | 9109.32 | 89.58 | 9138.84 | 89.98 | 9158.52 | 89.37 |
| 9197.87 | 89.56 | 9210.99 | 89.2 | 9233.95 | 89.35 | 9270.02 | 88.81 | 9319.22 | 89.05 |
| | | | | | | | | | |

```
88.39 9381.53
87 9568.46
86.75 9725.88
                                     88.45 9437.28
86.65 9597.98
86.58 9742.28
                                                             88.96 9443.84
 9499.59
                                                            87.04 9607.82
                                                                                   86.74 9643.89
                                                                                                         86.42
86.67
               86.97 9834.11
 9820.99
                                      86.39 9847.22
                                                            86.73 9896.42
                                                                                   86.65 9922.65
                                                                                                          86.01
 9962.01
               85.9810014.48
                                      84.1110053.84
                                                             83.4710073.51
                                                                                   84.4510083.35
10096.47
               84.7310106.31
                                      84.0510129.27
                                                            83.6110142.38
                                                                                   84.24 10155.5
                                                                                                          86.16
               88.410168.62
95.0510250.61
                                     91.7710175.18
95.4810270.29
                                                              93.610198.14
94.910312.92
                                                                                   96.0310207.97
96.0510329.32
10162.06
                                                                                                          96.85
10237.49
10352.28
               96.8510365.39
                                       95.610388.35
                                                            95.7110417.87
                                                                                    95.210424.43
                                     95.2610703.19
94.8710857.33
96.7911044.26
95.9611149.21
                                                            95.1610709.75
96.0410890.12
                                                                                   94.8610742.54
96.3510955.71
96.7211090.17
10640.88
               95.0610670.39
                                                                                                          95.37
10762.22
               97.0711001.63
96.6611126.25
                                                            97.1211077.06
                                                                                                          96.01
11113.13
                                                            96.3111168.88
                                                                                   96.21
                                                                                              11182
                                                                                                          95 75
                                                                                   96.0811280.39
11204.96
                                                            95.7611260.71
               96.1911224.64
                                      96.23 11231.2
                                                                                                          95.46
                                                            95.7611260.71
95.7811398.45
94.67 11614.9
93.5511890.39
94.112077.32
95.2812211.78
11306.63
11427.97
               95.6711336.14
95.1911490.28
                                     95.3511362.38
95.0611546.03
                                                                                   94.6311411.57
94.3811641.14
                                     93.911837.91
94.15 12047.8
95.0512162.59
11716.57
               94.0611723.13
                                                                                   93.1511929.74
                                                                                                          93.33
                                                                                   94.6512093.72
12103.56
               95.1412146.19
                                                                                   95.25 12224.9
                                                                                                          95.09
               95.2612287.21
94.9212477.43
                                     95.6612333.13
94.5612493.82
                                                            95.2512395.44
94.7912516.78
                                                                                   95.4212411.83
94.5512526.62
12260.98
12444.63
               94.5812588.93
95.2312779.15
                                     94.8212621.73
94.8312798.82
                                                            94.7512684.04
95.1612805.38
                                                                                   94.9412736.51
94.6712880.81
12569 25
12752.91
               95.7512939.84
12900.49
                                       94.612966.08
                                                            93.6212992.32
                                                                                   93.8613051.35
                                                                                                          93.58
               95.8713248.12
95.73 13395.7
95.1713625.27
                                                                                                          95.31
13189.09
                                      95.9313294.04
                                                            95.8313323.55
                                                                                   95.9513330.11
13339 95
                                     95.5413415.38
95.1613654.79
                                                            95.6213474.41
94.99 13700.7
                                                                                   95.3513546.56
95.01 13733.5
13569.52
13789 25
               94.6513825.32
                                      94.31 13861.4
                                                            94.3313904.03
                                                                                   93.9513953.23
                                                                                                          93 78
                                      92.8614231.99
                                                            92.9114268.06
14018.82
               93.3314156.56
                                                                                   92.8214343.49
14428.76
               92.8614500.91
                                      92.9814546.83
                                                            92.8114579.62
                                                                                   93.0314628.81
                                                                                                          93.08
                                     94.5414878.06
93.5815071.55
14858.38
               94.5214868.22
                                                            93.38 14904.3
                                                                                   93.8814927.25
                                                                                                          93.68
14946.93
               93.8314983.01
                                                            93.6615107.63
                                                                                   93.4515120.75
                                                 15288
15186.34
               93.4115202.74
                                     93.56
                                                            93.3415386.39
                                                                                   93.3815399.51
                                       92 115425 75
15406 07
               92.2315415.91
                                                            93 2815438 86
                                                                                   96 3315445 42
 15465.1 100.71
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .105 7935.14 .066 7987.62 .015 8105.61
                                                                                  n Val Sta
.066 8548.52
Bank Sta: Left Right Lengths: Left Channel Right
7935.14 8548.52 1070.14 1752 1559.36
Left Levee Station= 65 Elevation= 107.03
Right Levee Station= 15465.1 Elevation= 100.71
                                                                                   Coeff Contr.
                                                                                                          Expan.
| Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R | 45.07 | 7932.39 | 95.5 | 8536.3410203.94 | 93.7410203.9410970.14 | 11024.23 | 15549.3 | 96.3
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                      102.92
                                                     Element
                                                                                         Left OB
                                                                                                         Channel
                                                                                                                        Right OB
                                                    Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                           0.105
                                                                                                        0.058
1752.00
                                                                                                                        0.095
  W.S. Elev (ft)
Crit W.S. (ft)
                                    102.87
                                                                                         1070.14
                                                                                       57749.09
57749.09
                                                                                                       14290.53
                                                                                                                       49348 16
  E.G. Slope (ft/ft) 0.000199
                                                                                                       14290.53
                                                                                                                      49348.16
                                                    Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
  O Total (cfs)
                                    125000.00
                                                                                         43577.48
                                                                                                        41132.03
                                                                                                                        40290 49
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                    15372.06
                                                                                                         613.38
                                                                                                                        6916.58
                                                                                         0.75
                                         1.03
                                                                                                            2.88
                                                                                                                            0.82
  Max Chl Dpth (ft)
Conv. Total (cfs)
                                         40.83
                                                                                                           23.30
                                    8872154.0
                                                                                         3093009.0 2919438.0
                                                                                                                           2859708.0
                                                     Wetted Per. (ft)
  Length Wtd. (ft)
Min Ch El (ft)
                                   1469.16
                                                                                                         631.51
                                                                                                                        6919.95
                                                     Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                                         0.28
                                      62.04
                                                                                         0.09
                                                                                                                           0.09
                                                                                                      0.81
40372.13
  Alpha
                                          2.96
                                                                                             0.07
                                                                                                                            0.07
  Frctn Loss (ft)
  C & E Loss (ft)
                                        0.00
                                                    Cum SA (acres)
                                                                                       13726.80
                                                                                                        1855.72
                                                                                                                      15731.71
Warning: The cross-section end points had to be extended vertically for the computed water surface.
            Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
```

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 147.34*

| INPUT | | | | | | | | | |
|-----------|----------|---------|-------|---------|--------|---------|--------|---------|--------|
| Descripti | on: RGV | -04, | | | | | | | |
| Station E | levation | n Data | num= | 450 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 94.5 | 14.38 | 98.05 | 25.88 | 98.56 | 37.39 | 100.15 | 55.36 | 101.04 |
| 71.9 | 106.85 | 89.82 | 106.1 | 108.92 | 100.11 | 134.63 | 91.51 | 142.86 | 90.51 |
| 153.71 | 92.21 | 161.6 | 94.32 | 175.67 | 93.92 | 202.02 | 93.77 | 287.9 | 93.91 |
| 337.66 | 93.71 | 368.37 | 94.16 | 391.66 | 93.74 | 465.34 | 93.69 | 468.3 | 94.58 |
| 472.24 | 92.9 | 476.19 | 94.44 | 480.13 | 93.68 | 504.78 | 93.74 | 543.24 | 93.44 |
| 623.12 | 93.51 | 780.91 | 93.41 | 820.35 | 92.88 | 977.16 | 93.22 | 1069.55 | 93.32 |
| 1087.7 | 93.59 | 1150.45 | 93.35 | 1165.39 | 93.55 | 1204.24 | 93.38 | 1225.15 | 93.47 |
| 1264 | 93.23 | 1314.78 | 93.31 | 1365.58 | 93.22 | 1401.44 | 93.3 | 1446.25 | 93.23 |
| 1491.07 | 92.87 | 1526.92 | 93.24 | 1568.76 | 93 | 1655.4 | 93.08 | 1718.15 | 92.89 |
| 1751.02 | 92.98 | 1777.91 | 93.24 | 1810.77 | 93.28 | 1879.49 | 92.93 | 1906.39 | 92.39 |
| 1930.29 | 91.17 | 1945.23 | 90.69 | 1957.18 | 90.97 | 1987.06 | 90.69 | 2019.93 | 91.19 |
| 2052.8 | 90.97 | 2067.73 | 91.23 | 2108.79 | 91.48 | 2124.51 | 91.72 | 2145.42 | 91.2 |
| 2175.29 | 91.04 | 2199.2 | 91.24 | 2229.08 | 91.02 | 2238.04 | 91.66 | 2247 | 91.12 |
| 2309.75 | 91.59 | 2324.69 | 91.45 | 2333.65 | 90.8 | 2348.6 | 91.65 | 2378.47 | 90.78 |
| 2408.35 | 91.63 | 2444.21 | 93.84 | 2468.11 | 92.3 | 2483.04 | 91.92 | 2518.9 | 91.69 |
| 2530.85 | 91.82 | 2577.91 | 91.81 | 2610.26 | 91.56 | 2689.21 | 91.44 | 2772.87 | 91.59 |
| 2856.53 | 91.5 | 2901.35 | 91.74 | 3005.92 | 91.6 | 3068.67 | 91.76 | 3133.3 | 91.72 |
| 3165.65 | 92.04 | 3230.01 | 91.94 | 3262.87 | 92.08 | 3397.51 | 92.12 | 3429.86 | 92.25 |
| 3597.52 | 92.35 | 3657.28 | 92.14 | 3688.68 | 92.36 | 3742.6 | 92.24 | 3769.55 | 92.3 |
| 3872.01 | 92.25 | 3959.04 | 92.54 | 4093.49 | 92.54 | 4114.4 | 92.67 | 4147.28 | 92.55 |
| 4254.84 | 92.75 | 4281.72 | 92.63 | 4314.15 | 92.81 | 4335.71 | 92.61 | 4373.47 | 92.92 |
| 4395.04 | 92.77 | 4421.99 | 92 | 4443.56 | 91.87 | 4586.48 | 92.07 | 4616.35 | 92.02 |
| 4676.1 | 92.22 | 4700.01 | 92.08 | 4734.73 | 92.38 | 4745.51 | 92.87 | 4767.08 | 92.79 |
| 4799.42 | 91.88 | 4876.28 | 91.98 | 4927.08 | 91.76 | 4992.8 | 91.8 | 5034.64 | 92.31 |
| 5052.56 | 92.93 | 5058.54 | 92.04 | 5061.53 | 93.1 | 5067.5 | 92.51 | 5100.36 | 92.4 |
| 5106.34 | 92.6 | 5142.2 | 92.26 | 5190 | 92.45 | 5207.92 | 92.28 | 5263.15 | 93.26 |
| 5300.89 | 93.55 | 5333.24 | 92.65 | 5354.8 | 93.06 | 5399.14 | 92.64 | 5408.1 | 92.25 |

91.69 5748.71 93 5901.09

91.88 6253.64

91.69 6456.81

91.39 6976.67

93.23 7158.93

6677.9

91.76

91.93

91.7

91 79

91.56

92.15 5570.49

91.94 5724.81

92.69 5865.23

91.92 6169.98

91.84 6397.05

91.59 6636.07

91.6 6943.81 92.54 7141

92.54

```
91.69 7221.67
83.69 7273.14
65.71 7298.85
                                                                                 95.04 7236.61
77.06 7283.11
60.53 7320.54
              94.79 7249.9
.18929 7289.75
                                     70.71 7295.99
  7285.0771
                                                                                                        62.3
                                     70.71 7295.99 65.71 7298.85
64.57 7363.9 64.17 7379.73
71.43 7420.2171.58426 7438.47
82.12 7509.61 81.85 7520.27
77.97 7598.52 80.46 7616.3
               63.38 7353.06
67.91 7417.03
                                                                                 65.02 7389.18
72.47 7456.76
  7399.19
                                                                                                       74.63
  7466.93
7541.61
                                                                                 82.32 7530.94
85.55 7619.86
               75.52 7495.38
                                                                                                       80 75
               81.09 7570.06
                                                                                                       86.23
  7634.08
               85.68 7641.19
80.67 7701.65
                                     86.3 7651.86
80.75 7740.77
                                                           88.84 7658.97
83.88 7751.44
                                                                                 88.18 7673.2
87.11 7762.11
                                                                                          7673.2
               89.21 7790.55
92.89 7897.22
                                     90.89 7808.33
93.77 7937.53
93.25 8031.41
                                                           89.55 7822.16
                                                                                 89.9 7847.45
92.95 7966.13
92.22 8085.82
  7772.78
                                                           93.1 7955.25
92.23 8049.54
  7991.52
               93.49 8016.91
               93.58 8122.08
91.22 8194.61
                                     92.92 8132.96
90.73 8212.75
                                                           92.94 8147.47
91.15 8238.14
                                                                                 92.2 8161.98
90.78 8281.66
  8103.95
  8172.86
                                                                                                       91.04
   8299.690.75969 8314.3
8408.6 90.36 8437.61
                                     90.53 8339.69
90.43 8452.12
                                                           91.55 8361.45
89.62 8470.25
                                                                                 91.44 8372.33
89.11 8502.9
                                                                                 90.14 8629.83
   8517.4
               90.22 8550.04
                                     90.51 8571.8
                                                           90.01 8615.32
                                                                                                       89.86
                                      89.51 8749.52
  8880.08
               89.62 8887.33
                                     89.18 8912.72
                                                           88.63 8948.98
                                                                                 88.08 9025.15
                                                                                                       87.76
                                     87.84 9108.56
87.6 9275.39
87.55 9416.83
 9057.79
9217.37
               88.08 9068.67
87.97 9239.13
                                                           87.54 9170.21
87.62 9304.41
                                                                                 87.76 9199.23
87.85 9318.92
                                                                                                       87.35
               87 59 9387 83
  9333 42
                                                           87.04 9460.36
                                                                                 87.03 9518.39
                                                                                                       85 55
                                     85.86 9594.55
                                                           85.38 9609.06
                                                                                 86.07 9619.94
               85.06 9583.67
  9561.91
                                                                                                       85.51
                                                                                 89 9688.85
94.29 9779.52
                                                           87.21 9681.59
95.47 9765.01
  9645.33
               85.18 9659.83
                                     85.69 9674.34
                                                                                                       91.69
                                                                                 95.74 9906.45
94.8810098.67
94.410243.74
                                     95.08 9866.56
                                                           95.75 9891.95
  9801.28
               94.19 9848.42
                                                                                                       94.73
                                                           94.7410000.75
94.7510211.11
                94.85 9964.49
                                     94.45 9971.74
                                     94.45 9971.74
94.6110163.95
94.2210323.53
95.4910559.27
               94.7810134.94
10113.18
                                                                                                       94.56
                                                                                 94.1410370.68
96.3510612.29
10280.01
               94.4810287.27
                                                           94.6110345.29
                                                                                                        94 2
                                                           95.6510588.29
               95.1710486.73
                                     96.0810707.96
10657.19
               96.4310693.46
                                                            95.510733.35
                                                                                 96.0110747.86
                                                                                                       95.45
                                     95.5210918.32
94.3411063.39
                                                           95.0210947.34
94.3211081.53
10863.92
               95.2810896.56
                                                                                 95.2710979.97
                                                                                                       94.99
 11008.99
                95.2411048.88
                                                                                  94.811150.43
                                                                                 93.3311608.21
               94.4611317.27
                                      94.211407.94
                                                           93.7511563.15
11212.09
                                                                                                       92.95
                                     92.9911708.96
95.1111828.64
                                                           92.7311737.97
94.4711875.79
                                                                                 93.6611766.98
94.1811902.21
11615.33
               93.1511686.46
                94.2111817.76
11970.96
               94.4212006.53
                                     94.7612031.74
                                                           95.29 12065.8
                                                                                 95.0312151.43
                                                                                                       95.19
               95.5412205.82
                                     94.81 12242.1
                                                           94.5212260.22
                                                                                  94.712285.61
                                     94.44 12365.4
94.7812575.76
12296.49
               94.6612343.64
                                                           94.6312401.67
                                                                                 94.5412480.68
                                                                                                       94.58
                                     95.0412753.46
                                                           94.0812782.48
12688.18
               94.3512709.95
                                                                                 93.28 12811.5
                                                                                                       93.47
12876.78
                                     93.56 12933.5
95.8513145.16
                                                           95.4512971.08
95.7 13177.8
               93.2912905.79
                                                                                 95.6312985.58
                 95.813111.31
                                                                                 95.8113185.05
                                                                                                       95.29
                                     95.4213279.35
94.7813628.13
93.9913952.93
13195 93
               95 6113257 59
                                                           95 4713344 63
                                                                                 95.2513424.42
                                                                                                       95 14
                 94.813594.88
                                                           93.0314009.82
                                                                                 92.8614107.03
13732.69
                 94.113786.97
                                                                                                       92.71
                                                                                 92.514438.93
93.27 14685.5
 14197.12
                92.7814218.45
                                     92.6614275.35
                                                           92.7314400.02
14536.13
               92.4414557.47
93.4114755.45
                                     92.7114628.59
                                                           92.9214664.16
                                                                                                       92.99
14704.46
14875.12
                                     93.2114820.73
                                                           93.42 14857
93.01 14925.9
                                                                                 93.4214867.87
               93.93
                                     93.9414896.89
                                                                                 93.4514951.28
                          14886
               93.93 14886 93.3715012.95
14973 05
                                     93 1115110 86
                                                           93.1415150.76
                                                                                 92 9515165 27
                                                                                                       93 08
               92.9815255.94
                                     93.1415350.23
                                                           93.1515441.76
                                                                                 93.2415473.54
                                                                                                       93.42
  15480.8
               92.2515491.68
                                     92.1115502.56
                                                           93.0115517.06
                                                                                 95.7915524.31
                                                                                                        97.9
15546.08 100.79 15554.6
                                    100.5615558.54
                                                           99.2715577.55
                                                                                 99.2715586.08
                                   num= 5
n Val Sta
.066 7283.11
Manning's n Values
                                                                                                       n Val
      Sta n Val Sta
0 .105 7236.61
                                                          n Val
                                                                                 n Val
                                                            .015 7417.03
                                                                                  .066 7966.13
                                                                                                        .095
Lengths: Left Channel
                                                                    Right
                                                                                  Coeff Contr.
                                                                                                       Expan.
                                    1070.14 1752 1559.36
    Sta L Sta R
0 7236.61
                           Elev Permanent
                          95.46
                                    T
71.9
Left Levee Station= 71.9
Right Levee Station=15546.08
                                                    Elevation= 106.85
                                                    Elevation= 100.786
| Sta L | Sta R | Elev | Sta L | Sta R | 1890.99 | 7205.97 | 92.97 | 7903.61 | 9776.25
                                                 2
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                    RS: 147.01*
Description: RGV-04,
Station Elevation Data
                                                451
                                                  Sta
                                      Elev
                          15.76
78.8
                                    96.35
106.67
                                                28.37
93.53
                                                          96.67
106.58
                                                                      40.97
97.22
                                                                               100.17
106.06
                                                                                          60.68
143.39
                                                                                                     100.25
91.22
          Ω
               93.76
                          170.2
   151.72
               90.27
                                     94.37
                                              184.08
                                                           93.66
                                                                    210.06
                                                                                 93.49
                                                                                          252.99
                                                                                                       93.45
                        343.82
480.41
                                                374.1
484.3
                 93.6
                                                                     397.06
                                                                                 93.29
               92.58
                                                                     508.61
                                                                                  93.2
   476.52
                                     93.74
                                                           93.16
                                                                                          546.53
                                                                                                           93
  625.3
1115.18
                 93.1
                          780.9
                                     92.93 819.79
92.91 1177.81
                                                           92.52 974.41
92.98 1221.59
                                                                                 92.78 1077.2
92.86 1274.21
                                                                                                       92 93
               93.08 1150.22
               92.9 1355.07
92.57 1613.82
  1314.63
                                     92.63 1387.41
                                                           92.86 1425.14
                                                                                 92.72 1503.31
                                                                                                       92.77
                                                            92.9 1705.46
                                                                                 92.65 1729.72
                                     92.86 1643.47
  1764.76
                90.94 1775.54
                                     91.14
                                              1802.5
                                                            90.9 1832.14
                                                                                 91.28 1861.79
                                                                                                       91.15
                                     91.7 1945.35
91.68 2036.99
                                                           91.32 1972.3
91.27 2093.59
                                                                                  91.21 1993.87
                 91.2
                                                                                 91.48 2115.15
  2020.82
                        2028.9
  2128.63
               91.51 2155.58
92.01 2335.49
                                     90.9 2182.53
92.03 2364.67
                                                           91.62 2214.88
91.32 2435.9
                                                                                 93.35 2236.44
91.23 2511.37
                                                                                                       91.35
                                     91.46 2721.6
92.25 2923.75
                                                           91.35
92.12
                                                                                 91.47 2817.06
92.24 3074.85
  2586.83
               91.28 2627.27
                                                                    2778.2
                                                                                                        91.4
  3104 04
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Left Levee Station= 78.8
Right Levee Station=15627.06
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                                                        Elevation= 100.862
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CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                      RS: 146.67*
INPUT
Description: RGV-04
Station Elevation Data
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94.78
102.3
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93.0514657.25
                                                                                                                             91.6414530.14
93.214682.67
                                                                                                                                                                 92.2
                                                                                           92.5614764.59
92.3914921.57
                                                                                                                             92.4114787.19
92.7414934.54
14705 27
                       93.1814719.39
                                                           93.114739.16
                                                                                                                                                               92 54
                                                         92.4914899.97
92.4515103.55
                       92.3914887.01
14969.11
                       92.5815025.28
                                                                                           92.0515168.52
                                                                                                                              92.0215182.65
                                                                                                                                                               92.13
                       91.9315254.31
92.9115583.75
                                                         92.01 15292.8
92.9715621.61
 15210.89
                                                                                           91.9415340.74
                                                                                                                              92.1315419.92
                                                                                           92.9215630.26
15507.48
                                                                                                                               92.315643.22
                                                                                                                                                               92.13
                   92.7115674.14
100.9415719.84
                                                                                                                             97.5815702.39
96.715745.41
15660.02
                                                         94.8515682.62
                                                                                           94.4215696.74
15708.03
                                                      100.0415733.61
                                                                                         100.2615741.48
15802.46
                       96.3915808.36
                                                         97.02 15812.3
                                                                                           98.6515828.03
                                                      num=
Manning's n Values
       Sta n Val Sta n Val Sta 0 .066 5839.56 .07 5887.2
                                                                                       n Val Sta
.025 5996.78
                                                                                                                            n Val Sta

        Bank Sta: Left
        Right
        Lengths: Left Channel
        Right

        5839.56
        6594.63
        1070.14
        1752
        1559.36

        Ineffective Flow
        num=
        2
        1070.14
        1752
        1559.36

        Sta L
        Sta R
        Elev
        Permanent
        0
        5839.56
        95.33
        T

                                                                                                                               Coeff Contr.
| Sta L | Sta R | Liev | Fermion | Sta L | Sta R | Liev | Fermion | Sta L | Sta R | Sta C | Sta L | Sta R | Sta C | St
                                                                                Elevation= 106.48
                                                                                Elevation= 100.938
 Sta L Sta R Elev Sta L Sta R
2102.12 4286.86 92.22 6581.76 8766.49
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                       RS: 146.34*
 Description: RGV-04
Station Elevation Data
                                                       num=
                                                                          456
                       Elev
92.29
                                      Sta
18.52
                                                         Elev
92.95
                                                                          Sta
33.34
                                                                                                                          Elev
100.21
                                                                                                                                             Sta
60.19
          Sta
                                                                                                           48.15
                                                                                           92.89
         63.9
                       98.52
                                         71.31
                                                         98.67
                                                                           78.71
                                                                                         101.89
                                                                                                           84.27
                                                                                                                           102.56
                                                                                                                                              92.61
                                                                                                                                                               106.3
    182 65
                       94 65
                                        200 9
                                                         93 13
                                                                       267 86
                                                                                           92 69
                                                                                                          308 44
                                                                                                                              92 99
                                                                                                                                            356 13
                                                                                                                                                                 92 7
                                                         92.38
91.79
                                                                                           91.89 1003.97
     780.87
                       91.95
                                      818.66
                                                                        968.92
                                                                                                                              92.05
                                                                                                                                            1092.5
                                                                                                                                                               92.14
                       92.06 1137.92
91.93 1403.81
                                                         92.16 1195.62
91.45 1433.36
                                                                                           92.14 1245.14
91.32 1479.79
                                                                                                                             91.93 1321.3
91.5 1519.33
   1100.41
   1376.38
                       91.65 1637.4
92.38 1789.73
                                                                                                                             91.16 1730.91
90.85 2047.45
  1526.95
                                                         91.58 1678.15
                                                                                           91.02 1709.81
                                                                                                                                                               91.58
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93.1 3424.31 92.97 3537.05

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91.28 2265.78
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 2391.46
               92.66 2402.88
92.91 2520.94
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92.79 2528.55
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                                                                                   93.02 2467.62
92.81 2627.57
                                                                                                          92.72
92.91
 2635.19
                 93.3 2673.26
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                                               2692.3
                                                             93.16 2711.35
                                                                                    92.96 2764.66
                                                                                                           92.9
               93.23 2795.13
93.56 2974.12
                                                                                   93.14 2913.19
93.7 3042.67
  2783.7
                                      93.03 2848.45
                                                             93.38 2863.68
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  2966.5
                                      93.37 3019.82
                                                             93.32 3035.06
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 3076.94
3153.11
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90.21 3168.34
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89.9 3366.37
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89.99 3373.99
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90.76
                                                                                             3381.6
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  3396.84
               92.6 3408.26
88.96 3636.45
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89.17 3661.78
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  3747.2
                                      93.73 3773.86
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4526.96
                                      93.27 4329.86
                                                             93.14 4394.61
                                                                                                          93 19
                                      93.31 4634.53
                                                              93.4 4642.14
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                                                                                                          93.47
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92.78 4973.46
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74.53 5189.25
 4691.66
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92.77 5069.28
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                                                                                   92.83 5114.36
                                      95.26 5147.51
71.92 5196.14
57.54 5231.92
                                                                                   92.42 5163.72
68.57 5205.58
 5130.48
                                                             94.08 5150.75
                                                                                                          81.51
                                                             70.75 5202.61
57.63 5245.09
 5209.6756.40394 5220.63
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   5263.9
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71.07 5341.63 77.26
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5347.8
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79.21 536478.21996
 5323.12
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86.73 5520.62
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5458.9
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84.71 5478.58
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85.71 5711.95
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86.08 5727.38
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                                                                                    90.49 5832.27
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93.47 6013.53
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5979.95
               90.37 5869.29
93.78 5995.22
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92.41 6050.16
                                                                                   94.03 5955.54
91.45 6065.42
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                                       93.9 6129.52
                                                             93.19 6135.63
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                                                                                                          93 09
               93.38 6246.77
                                      93.35 6298.13
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                                                                                    92.86 6382.16
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 6438.18
6581.25
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92.45 6638.92 92.38 6680.94
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91.2 7469.47
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91.13 7487.78
90.48 7719.76
90.4 7872.37
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90.9 7515.26
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90.12 7826.59
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90.18 7887.63
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               90 68 7642 63
                                                                                                            90 3
                90.5 7783.86
 7918.16
                   90 7957.84
                                      90.18 8000.57
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92.28 8604.33
92.36 8963.79
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92.19 8690.38
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92.38 8777.06
92.42 9041.4
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92.2 8827.74
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 8562.19
8876.58
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               92.06 9114.65
92.68 9369.94
                                      92.27 9148.22
93.71 9419.88
                                                             92.13 9169.59
94.28 9438.2
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93.98 9490.08
 9102.44
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               93.97 9612.7
93.67 9877.72
                                      93.93
                                                             94.06 9692.06
 9561.34
                                                   9661
                                                                                   93.85
                                                                                                9777
                                                                                                          93.96
                                      94.11 9902.14
                                                             94.04 9944.87
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                                                                                   93.15 10646.9
93.1410720.15
                93.7310445.44
                                      93.2310462.35
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               93.2710668.26
                                      92.9110686.58
10662.15
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91.8210863.61
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92.3810894.13
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92.0710942.96
10729.31
10830.04
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92.2811150.47
10970 43
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                                      92 5111031 46
                                                             92.4311055.87
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                                      92.0211126.06
93.0611232.87
                                                            92.6311138.26
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11187.09
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93 12110.3
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93.4512002.93
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                                                             92.9212181.94
12062.92
               92.4712377.24
12346 73
                                                             92 5112416 91
                                                                                    93 2712426 07
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                                                             95.5812542.04
12587.81
               95.6812648.84
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                                                                                                          95.39
               95.2312798.37
94.9 13024.2
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94.4613097.44
12749.88
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                                                                                    94.9512926.55
12990.63
                                                             94.3913115.75
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                                                                                                          94.28
               94.0913228.66
                                                            94.0313268.34
94.22 13378.2
                                                                                   94.1413320.21
93.7613445.33
13192.04
                                      94.3813246.98
13332.42
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9313640.64
92.2913811.53
                                                             93.3313536.88
92.6613707.77
13475.84
               93.5213509.42
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               92.9513625.38
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                                                                                                          92.12
               92.2313967.16
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91.5314385.25
13936.65
14153.32
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14446.28
14516.47
                                                                                   91.97 14489
9314638.54
               91.3214455.44
                                      92.0214461.53
                                                             91.5214473.75
                                      91.9414608.02
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               91.9414568.35
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14653.79
14742.29
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92.1614818.59
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91.9314888.77
               93.1614669.05
                                      92.0814681.26
                 92.214769.76
                                      92.0214794.17
14916 01
               91.9714939.36
                                      92 1414953 37
                                                              91 914980 32
                                                                                    92 14 15051 4
                                                                                                          91 99
                                      91.4715221.41
92.0315477.74
                                                             92.3515572.35
15340.42
                91.4115444.18
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15695.65
15776.81
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96.715782.92
                                      92.1415737.14
99.8215789.01
                                                           92.3 15752.4
101.0115804.76
                                                                                    94.2815761.55
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 15833.6
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                                      94.9515914.92
                                                            94.9515922.78
                                                                                   95.7915928.03
15949.01
               97.41
                            Sta
      Sta n Val Sta
0 .066 5141.03
                                    n Val Sta
.07 5202.61
                                                                                                          n Val
                                                            n Val
                                                                           Sta
                                                                                   n Val
                                                                                                 Sta
                                                              .025 5316.94
                                                                                      .07 5943.33
                                                                                                            .085
                .066
Bank Sta: Left Right
                                    Lengths: Left Channel
                                                                     Right
                                                                                     Coeff Contr.
                                                                                                          Expan.
         5141.03 5943.33 1070.14 1752 1559.36 evee Station= 108.13 Elevation= 106.5
                                                                                               .1
Left Levee
                                                     Elevation= 106.52
Elevation= 101.014
                       Station=15789.01
Right Levee
Blocked Obstructions num=
Sta L Sta R Elev
 Sta L Sta R Elev
1863.45 5103.84 92.51
CROSS SECTION
RIVER: Rio Grande
                                    RS: 146
REACH: Lower Reach
Description: RGV-04, Updated on left with new survey to Station 1100.15.

Extended block obstruction, Bathymetric elevations translated from
                  TRWC 2008 Cross-sections
Station Elevation Data
                                    num=
                                     Elev
                            Sta
      Sta
                Elev
                                                    Sta
                                                              Elev
                                                                           Sta
                                                                                     Elev
                                                                                                 Sta
          0
               91.56
97.88
                          35.82
84.58
                                   91
101.49
                                                 51.74
90.55
                                                          100.23
                                                                        64.68
99.51
                                                                                 99.97 68.66
106.12 115.43
                                                                                                        97.89
106.49
     76.62
  119.41 105.94
191.32 95.14
                                      99.54 161.32
92.86 275.3
                         138.33
                                                            92.42
                                                                      169.32
                                                                                   90.41
                                                                                             178.32
```

0.067

1279.38

84750.89

101739.10

17026.04

17026.04

39613.09

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413.27
877.19
                                                                                           91.58 639.23
   783.21
                91.46
91.82
                                         91.38 966.17
91.76 1250.68
                                                                  91.45 1004.17
                                                                                           91.64 1100.15
                                                                                                                    91.74
91.97
                           1214.6
 1329.41
                 91.66 1388.46
                                         91.76 1424.55
                                                                  91.65 1447.51
                                                                                           91.11 1473.75
                                                                                                                    91.08
                                                                                           90.62 1933.02
92.86 2083.92
 1529.52
                 91.94 1555.76
                                           93.1 1608.25
                                                                  92.67 1627.93
 1946.14
                 91.13 1965.82
                                         92.89 1975.66
                                                                   92.6 2074.08
                                                                                                                    93.09
                 92.88 2126.56
93.67 2244.66
                                         93.28 2139.68
93 2277.46
                                                                  92.89 2165.93
93.13 2284.02
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93.62 2316.82
 2192.17
                                                                                                                    93.25
 2333.22
                 93.44 2349.63
                                         93.18 2395.55
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                93.52 2628.46
95.06 2713.75
89.25 2920.41
 2615.34
                                         94.01 2635.02
                                                                  93.58 2664.54
                                                                                           94.22 2677.66
                                                                                                                    93.32
                                         93.9 2723.59
90.22 2926.97
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92.76 2940.09
                                                                                           89.61 2743.27
92.53 2949.93
 2913.85
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92.78 3251.73
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93.85 3264.85
                                                                                           88.02 3215.64
94.08 3284.53
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 2959.77
                 88.22 2995.86
                  90.6 3241.89
 3232.04
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92.66 3346.86
93.35 3579.76
93.74 3743.78
93.83 4006.21
93.9 4134.14
 3297.65
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93.55 3491.19
                                                                  92.81 3409.18
93.63 3612.57
                                                                                           93.31 3428.87
                                                                                                                    93.18
  3468.23
                                                                                           93.52 3668.33
                93.53 3707.7
93.96 3960.28
                                                                  93.6 3799.55
93.96 4012.77
94.13 4176.79
                                                                                           93.77 3806.11
93.73 4048.85
 3697.86
                                                                                                                    93.65
 4055.42
                  93.6 4117.74
                                                                                            93.1 4199.75
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                93.11 4268.64
92.91 4442.5
73.89 4504.82
57.58 4560.82
                                         93.21 4298.16
95.2 4449.06
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94.38 4452.34
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92.81 4465.46
 4225.99
 4419.53
                                                                                                                    80.78
 4481.86
4549.82
                                         69.52 4507.82
57.58 4569.82
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58.33 4580.82
                                                                                           56.18 4535.82
58.78 4590.82
                59.48 4613.82
79.73 4659
81.07 4737.73
87.63 4829.58
85.44 4898.47
                                         60.04 4626.2
81.93 4665.56
 4601.82
                                                                  69.52 4632.76
                                                                                           69.85 4639.32
                                                                                                                    72.13
                                                                                          79.64 4708.21
84.08 4777.09
86.39 4878.78
85.02 4983.76
                                         81.81 4750.85
88.67 4842.7
85.54 4924.71
87.56 5046.08
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 4819.74
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84.72 4947.67
 4885.35
                                                                                                                    86.42
                                                                  87.66 5062.48
90.48 5173.98
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91.28 5193.65
 4996 88
                 86.58 5013.28
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                                         89.69 5157.58
 5108.39
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                                                                                          91.28 5193.65

93.86 5331.38

91 5423.2

93.54 5498.63

93.46 5711.78

92.91 5954.45

92.48 6377.48

92.27 6669.34
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92.24 5383.85
                                                                  94.11 5305.15
92.01 5406.81
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 5436.32
                 92.72 5452.72
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5734.74
                 93.26 5580.61
93.24 5856.07
                                         93.32 5639.64
92.98 5879.02
                                                                  93.59 5656.03
93.17 5905.26
                                                                                                                    92.83
                                         93.02 6252.86
92 6597.19
92.19 6931.68
                93.05 6062.67
92.37 6518.49
  5977 4
                                                                  92.48 6315.17
                                                                                                                    92 24
                                                                  92.28 6656.22
                                                                                                                    92.46
                                                                                               92 6980.87
  6738.2
                 92.44 6787.39
                                                                  92.26 6951.35
                                                                                                                    92.07
                91.7 7115.32
91.42 7269.45
91.29 7413.74
91.29 7610.49
                                         91.7 7161.23
91.01 7295.68
91 7456.37
91.53 7676.08
                                                                  91.44 7200.58
91.01 7315.36
91.24 7502.28
91.37 7735.11
                                                                                          91.41 7223.54
91.33 7364.55
91.11 7558.02
91.49 7767.9
 7243.21
 7571.14
                                                                                                                    91.36
                91.59 7800.69
91 8026.96
                                         91.32 7849.88
91.39 8063.04
                                                                  91.4 7866.28
91.24 8105.67
                                                                                          91.2 7918.75
91.42 8220.44
 7790.85
                                                                                                                    91.41
   7958.1
                 91.57 8338.5
                                                                  91.65 8443.44
91.79 8653.31
                                                                                            91.6 8495.9
91.46 8686.1
  8243 4
                                         91.41 8390.97
                                                                                                                    91.78
                 91.74 8620.52
                91.62 8735.29
93.61 9046.83
93.38 9394.43
                                         91.38 8758.25
93.27 9102.57
93.35 9410.83
                                                                                           91.63 8850.07
93.38 9286.21
93.17 9519.04
 8699.22
                                                                  91.62
                                                                               8814
                                                                                                                     91.8
                                                                  93.68 9204.23
93.48 9460.02
 9302.61
                                                                                                                    93.74
                 93.7 9591.19
93.6510004.38
                                         93.09 9755.15
93.5710128.99
                                                                  93.35 9810.9
93.0210138.83
                                                                                           93.58 9843.7
93.1510233.93
                                                                                                                    93.52
 9545.28
 9899.44
                                                                                          93.2510368.38
92.76 10460.2
91.8410558.58
10276 56
                 92.8910283.12
                                         93 0310345 43
                                                                  92 8110361 82
                                                                                                                    92 81
                                                                  91.9210433.97
92.5710542.19
                                         92.0710532.35
10470.04
                 92.1710512.67
                                                                                                                    91.52
                                         91.5510663.51
                                                                  91.4110693.02
                                                                                            92.610702.86
                 92.1210611.05
                91.7610784.82
91.9710873.34
92.5310997.93
                                         90.5510817.61
91.5310886.46
93.8311056.95
10758.59
                                                                  91.0910830.72
                                                                                          92.1210843.84
                                                                                                                    91.21
10860.23
10974.98
                                                                  91.83 10925.8
93.62 11079.9
                                                                                          91.610955.31
94.0311132.36
                                                                                                                    94.03
                                         94.1711250.39
93.7611473.34
                                                                  94.3911342.19
93.8611538.91
                                                                                           94.3111391.37
93.6311604.48
11191 37
                 94.3311220.88
                 94.0811453.66
                                                                                          92.55 11938.9
91.9712171.69
92.712256.93
11630.71
                 93.28
                            11693
                                         92.8711706.12
                                                                  93.0511866.77
                                                                                                                    92.14
                                         92.0312056.93
92.1812233.98
                                                                  91.8912112.67
91.9412247.09
                  92.311994.64
                 91.8612220.87
12204.47
                                                                                                                    94.93
                                         96.0512352.01
95.412502.83
95.212679.88
                                                                  95.5912381.52
95.6712525.78
                                                                                          95.4512424.14
95.1312597.91
12296.27
                 95.8112315.95
                 95.6312496.27
 12430.7
                                                                                                                    95.25
                95.0812656.92
94.7912899.54
 12630.7
                                                                      9512765.12
                                                                                           94.8112794.63
                                                                                                                    94 91
12863.48
                                         94.23 12952
94.0613079.87
                                                                  94.2412965.12
                                                                                           94.4912978.23
 12997.9
                 94.3813020.85
                                                                  93.8513119.21
                                                                                          94.2213138.89
                                                                                                                    93.79
                                                                                          93.913256.92
93.3213420.85
92.7313545.44
92.3113696.25
                                         93.5313230.69
                 93.9213217.57
                                                                  94.3413237.25
                 93.3813279.87
                                         93.53 13352
                                                                                                                    93.01
13273.31
                                                                   93.213384.78
                                         92.6813479.86
92.313666.75
13437.24
                 93.1113450.36
                                                                  92.9613525.76
13561.83
                                                                  91.9313686.42
                 92.3913633.96
                                                                                                                    92.05
                91.7613791.33
92.4513951.99
                                         91.9513837.24
92.2814004.45
                                                                  91.9213843.79
92.414033.95
13745 43
                                                                                           92.1213879.86
                                                                                                                    92 07
                                                                                               9214083.13
                                                                                           90 9814338 87
14092 97
                 91 8314112 64
                                         92 0514125 76
                                                                  91 64 14302 8
                                                                                                                    91 18
                                         90.9314437.23
91.6814558.54
                                                                  91.8114443.78
91.6614601.16
                                                                                           91.19 14456.9
92.1214620.83
14473.29
                 90.83 14502.8
                                                                                                                    92.95
14633.95
14722.47
                92.7414650.34
92.7714745.42
                                         93.1214666.73
91.8414774.93
                                                                  91.7614679.85
91.6214801.16
                                                                                           91.2514706.08
91.7814827.39
                                                                                                                    91.47
                91.5614984.76
90.9315260.17
                                                                  91.7415079.84
90.8415309.35
14902.79
                                         91.5315001.15
                                                                                           91.5215168.36
                                                                                                                    91 01
15243.77
                                         91.1115292.95
                                                                                           90.9915388.03
                                                                                                                    90.88
15499 51
                 91.6615535.57
                                         92 0715637 21
                                                                  92 6115725 73
                                                                                            92 715778 19
                                                                                                                    92 37
               101.0915889.67
15869.99
                                         99.5915912.62
                                                                  99.9615919.17
                                                                                           96.3815925.73
                                                                                                                    94.03
15932.29
                93.5116027.37
                                         93.51 16037.2
                                                                  94.5616043.76
                                                                                           97.2816069.99
Manning's n Values
      Sta n Val Sta
0 .066 4442.5
6.07 .066
                                        n Val
                                                         Sta
                                                                  n Val
                                                                                                                     .085
                                                                    .025 4613.82
                                           .07 4504.82
                                                                                             .07 5292.03
                                        Lengths: Left Channel Right 2057.24 1788.32 1279.38
Bank Sta: Left Right 4442.5 5292.03
                                                                                            Coeff Contr.
Ineffective Flow
Sta L Sta R
0 4442.5
                          num= 2
Elev Permanent
                              95.2
 5292.0316069.99
                          94.11
                   Station=
Left Levee
                                       115.43
                                                      Lievation=
Elevation=
1
                                                          Elevation= 106.49
                        Station=15869.99
Blocked Obstructions
                                      num=
                              Elev
Sta L Sta R Elev
1541.41 3752.11 93.16
CROSS SECTION OUTPUT Profile #Design Flow
                                                          Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
  Vel Head (ft)
                                             0.02
                                                                                                    0.066
                                                                                                                     0.065
  W.S. Elev (ft)
Crit W.S. (ft)
                                          102.09
                                                                                               2057.24
29609.83
                                                                                                                  1788.32
```

89.73

Area (sq ft) Flow (cfs)

0.000097

E.G. Slope (ft/ft) Q Total (cfs)

| Top Width (ft) | 15939.20 | Top Width (ft) | 4311.71 | 849.53 | 10777.96 |
|-------------------|------------|------------------------|-----------|----------|-----------|
| Vel Total (ft/s) | 0.95 | Avg. Vel. (ft/s) | 0.80 | 1.63 | 0.87 |
| Max Chl Dpth (ft) | 47.62 | Hydr. Depth (ft) | 6.87 | 20.04 | 7.86 |
| Conv. Total (cfs) | 12678230.0 | Conv. (cfs) | 2406754.0 | 2821870 | 7449611.0 |
| Length Wtd. (ft) | 1585.50 | Wetted Per. (ft) | 4316.38 | 876.06 | 10789.40 |
| Min Ch El (ft) | 54.47 | Shear (lb/sq ft) | 0.04 | 0.12 | 0.05 |
| Alpha | 1.28 | Stream Power (lb/ft s) | 0.03 | 0.19 | 0.04 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 85861.87 | 37210.64 | 113725.90 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 12980.38 | 1708.62 | 14148.14 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 145.67*

| Danasiani. | DOTT 0.4 |
|--------------|----------|
| Description: | RGV-04, |

| INPUT | | | | | | | | |
|----------------------|---------------------------------|----------------|----------------------|--------------------|------------------|----------------|----------------------|----------------|
| Descriptio | | | 400 | | | | | |
| Station El
Sta | evation Data
Elev Sta | num=
Elev | 439
Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 91.77 39.79 | 91.14 | | | 57.47 | 98.22 | 64.82 | 99.28 |
| 71.84 | 99.12 76.26 | 97.69 | | | 100.58 | 101.39 | 110.53 | 105.75 |
| 129.72
215.73 | 105.45 151.16
92.93 229.63 | 98.08
93.29 | | 90.77
92.76 | 185
320.8 | 89.48
92.94 | | 93.42
92.72 |
| 396.15 | 93.87 417.95 | 92.4 | | | 639.54 | | 680.24 | 92.4 |
| 784.74 | 92.11 891.86 | 92.03 | | 92.15 1 | | | 1125.45 | 92.37 |
| 1155.66
1502.05 | 91.45 1202.6
91.37 1546.97 | | 1305.24
1588.64 | 91.38
91.69 1 | 1416.6
596 52 | 91.54
91.47 | 1478.1
1667.37 | 91.56
91.59 |
| 1710.67 | 91.49 1738.22 | | 1769.71 | 91.2 1 | 836.63 | | 1868.11 | 92.51 |
| 1931.1 | 92.18 1954.71 | | 2139.79 | 91.05 2 | | | 2228.35 | 91.09 |
| 2243.11
2452.19 | 91 2320.79
93.13 2462.03 | | 2336.53
2501.85 | 91.44 2
92.78 | | | 2439.89
2553.01 | 92.94
92.94 |
| 2568.76 | 92.7 2585.03 | 92.92 | 2623.87 | 92.91 2 | 631.74 | 93.38 | 2688.34 | 93.13 |
| 2698.17 | 94.23 2712.94 | | 2737.53 | | | | 2762.13 | 91.35 |
| 2776.9
2978.11 | 90.96 2875.78
91.01 3037.64 | | 2895.45
3059.77 | 91.12 2
91.32 3 | 094.21 | | 2962.37
3123.72 | 91.23
91.22 |
| 3155.24 | 91.77 3163.11 | 91.51 | 3198.54 | 91.72 3 | 214.28 | 91.19 | 3241.84 | 92.36 |
| 3257.58 | 91.56 3269.39
89.02 3441.04 | | 3277.26 | 88.64
88.75 3 | 3293 | | 3327.89
3513.43 | 88.87 |
| 3369.71
3529.17 | 91.02 3540.97 | | 3497.68
3552.78 | 88.2 3 | | | 3615.76 | 91.13
88.03 |
| 3684.55 | 88.02 3704.23 | 88.11 | 3792.79 | 88 3 | 812.46 | 88.17 | 3859.8 | 88.18 |
| 3879.48
3958.2 | 89.87 3891.3
90.96 3973.95 | 91.31 | 3903.1
4019.09 | | 918.85
4048.6 | | 3942.46
4107.63 | 89.3
91.65 |
| 4162.88 | 91.88 4257.68 | | 4301.96 | 92.13 4 | | | 4402.98 | 92.23 |
| 4424.95 | 92.11 4471.69 | | 4511.04 | 92.3 4 | | | 4557.77 | 91.18 |
| 4577.45
4759.44 | 90.85 4619.27
91.5 4764.35 | 91.56 | 4638.95
4808.4 | 91.61 4
91.97 4 | | 90.9 | 4715.2
4842.97 | 90.96 |
| 4889.65 | 92.26 4914.22 | | 4924.05 | 92.3 4 | | | 5014.96 | 91.55 |
| 5054.27 | 91.79 5088.67 | | 5125.52 | 91.84 5 | | | 5196.78 | 91.73 |
| 5213.97
5295.0790 | 91.93 5233.63
.08029 5314.71 | | 5248.37
5331.91 | 91.9 5
92.31 5 | | | 5280.32
5365.96 | 90.9
85.73 |
| 5383.5579 | .44789 5390.72 | 78.26 | 5400.01 | 78.65 5 | 415.49 | 77.64 | 5427.87 | 72.56 |
| 5437.24 | 70.82 5472.97 | | 5473.8666 | | | | 5491.11
5554.92 | 58.6 |
| 5499.61
5563.7 | 58.55 5509.54
67.61 5573.01 | | 5517.34
5582.31 | 59.58 5
74.44 5 | | | 5603.24 | 61.27
74.6 |
| 5621.85 | 74.75 5626.51 | 75.94 | 5642.79 | | | 79.04396 | | 80.85 |
| 5707.92
5791.65 | 81.57 5717.22
79.44 5826.55 | | 5728.85
5838.18 | 80.13
82.16 5 | 5742.8
861 44 | | 5775.37
5873.06 | 79.18
84.09 |
| 5905.62 | 85.54 5917.25 | | 5952.13 | | | 89.1521 | | 89.7 |
| 6005.61 | 91.82 6030.24 | | | 93.42 6 | | | 6085.33 | 93.01 |
| 6102.79
6195.96 | 92.09 6117.35
93.35 6248.37 | | 6137.74
6329.55 | 91.2 6
93.74 6 | | | 6163.94
6428.87 | 92.29 |
| 6469.82 | 93.69 6509.28 | 93.43 | 6539.4893 | .41734 6 | 580.26 | 93.18 | 6623.93 | 93.08 |
| 6675.86
6816.35 | 93.3 6724.16
91.32 6888.85 | 93.29
91.31 | 6737.33
6939.3 | 92.98
91.4 6 | 6750.5 | | 6772.46
7043.16 | 91.55
91.39 |
| 7124.68 | 91.24 7185.18 | | 7246.96 | | 7258.6 | | 7319.74 | 91.64 |
| 7363.41 | 91.46 7474.99 | | 7492.55 | 91.55 7 | | | 7540.85 | 91.37 |
| 7571.59
7832.14 | 91.14 7654.54
91.03 7875.81 | | 7750.62
7890.36 | 90.82 7
91.11 7 | | | 7795.52
7957.32 | 90.7
91.17 |
| 7998.08 | 91.15 8047.57 | | 8059.22 | 91.39 8 | | | 8204.79 | 91.7 |
| 8263.01 | 91.55 8321.24 | | 8367.82 | 91.64 8 | | | 8463.89 | 91.57
91.2 |
| 8495.92
8833.64 | 91.46 8533.77
91.04 8880.21 | | 8669.31
8961.73 | 91.41 8
90.91 8 | | 90.72 | 8787.05
9005.4 | 90.86 |
| 9049.07 | 90.4 9060.72 | 90.53 | 9092.74 | 90.34 9 | 113.12 | 90.46 | 9162.62 | 90.39 |
| 9226.94
9411.36 | 90.75 9257.68
92.93 9424.54 | | 9292.81
9437.71 | 92.77 9
93.18 9 | | | 9369.32
9617.74 | 92.81
93.11 |
| 9648.48 | 92.91 9692.48 | | | 92.74 9 | | | 9811.84 | 93.04 |
| 9852.6 | 92.52 9995.35 | | | 92.4510 | | | 10219.43 | 92.27 |
| 10271.98
10592.08 | 92.0310298.32
91.1310600.82 | | 10482.74
10624.1 | 91.6810
90.6510 | | | 10571.71
10670.69 | 91.87
91.16 |
| 10688.16 | 91.5110711.45 | 90.84 | 10728.92 | 91.2210 | 758.03 | 90.81 | 10804.6 | 90.63 |
| 10830.8 | 91.2910839.54 | 90.73 | 10889.01
10979.25 | 90.61 1
90.7610 | | | 10941.41
11027.21 | 90.14 |
| 10953.05
11037.46 | 90.84 10964.7
90.4811063.66 | | 11081.12 | | 1101.5 | | 11153.89 | 90.61
91.72 |
| 11174.27 | 9211220.84 | | 11273.23 | 92.211 | 299.43 | 92.093 | 11325.63 | 92.24 |
| 11407.13
11619.97 | 92.1811450.79
93.6711663.28 | | 11506.09
11718.58 | 91.9811
93.2311 | | | 11571.68
11887.82 | 93.87 |
| 11936.88 | 92.6711960.17 | | 11986.37 | 92.5412 | | | 12143.55 | 92.5 |
| 12172.66 | 92.2312198.85 | 92.2 | 12210.49 | 92.6512 | 219.23 | 94.13 | 12271.63 | 94.77 |
| 12329.84
12521.95 | 94.2312367.68
93.7212594.72 | | 12373.5
12670.4 | 94.2512
93.71 1 | | | 12457.91
12757.72 | 93.71
93.9 |
| 12789.73 | 93.58 12959.2 | | 12984.76 | 93.6913 | | | 13022.6 | 93.54 |
| 13072.08 | 93.313083.73 | | 13089.55 | 93.5713 | | | 13112.89 | 93.37 |
| 13152.39
13363.16 | 93.3713169.97
92.7413377.71 | | 13220.53
13441.75 | 93.1313
92.3713 | | | 13304.94
13488.32 | 92.87
92.45 |
| 13540.71 | 92.0313581.46 | | 13660.06 | 92.2713 | | | 13710.04 | 92.41 |
| 13770.67 | 92.513796.86 | | 13866.72 | 92.2513
91.5714 | | | 14160 7 | 91.55 |
| 14067.56
14175.47 | 91.714087.94
92.1814184.25 | | 14146.15
14213.1 | 92.0814 | | | 14160.7
14300.42 | 91.69 |
| 14317.88 | 92.9214344.08 | 93.01 | 14370.28 | 91.7514 | 393.57 | 92.86 | 14408.12 | 92.74 |
| 14428.49
14640.98 | 92.0614454.69
91.1414655.53 | | 14477.98
14725.39 | 91.8314
90.9414 | | | 14592.6
14869.23 | 91.37 |
| 14885.49 | 90.2915000.96 | | 15097.97 | 90.5615 | | | 15220.22 | 91.17 |
| 15290.76 | 91.2415303.93 | | 15321.49 | 92.2315 | | | 15377.4 | 93.53 |
| 15391.95
15439.67 | 95.2315400.69
97.9515449.79 | | 15415.24
15476.51 | 96.9715
97.7515 | | | 15426.88
15491.78 | 100.51 |
| 15499.42 | 93.4515529.24 | | 15539.47 | 95.05 1 | | | 15585.53 | 93.65 |
| | | | | | | | | |

```
9315621.56
                                              93.6 15629.2 95.3915659.74
                                        num=
Manning's n Values
     Sta n Val Sta
0 .066 5331.91
75.86 .066
                                 Sta n Val
                                                                      n Val
                                                            Sta
                                                                                       Sta
                                                                                                n Val
                                                                                                                 Sta
                                                                                                   .07 6035.84
                                              .07 5400.01
                                                                        .025 5517.34
 6675.86
                                      Lengths: Left Channel
Bank Sta: Left
                           Right
                                                                                                  Coeff Contr.
                                                                                  Right
                                                                                                                           Expan.
Bank Sta: Left Right Lengths: Left Channel Right 5331.91 6035.84

Ineffective Flow num= 2
Sta L Sta R Elev Permanent 0 5331.91 92.31

6035.8415659.74 93.42 T
Left Levee
Right Levee
                          Station=
                                         110 53
                                                             Elevation= 105.75
                         Station=15426.88
                                                             Elevation=100.5133
Sta L Sta R Elev
3241.84 3918.85 92.12
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
Description: RGV-04 (end wall), RGV-01 (begin wall), new cross-section,
Bathymetric elevations translated from IBWC 2008 Cross-sections,
Section along left levee updated with 2017 survey
Station Elevation Data
               Elev Sta
93.53 35.11
96.22 255.23
91.31 557.98
                                          num=
                                                         451
                                                            Sta
                                              Elev
     Sta
                                            93.66 70.22
92.04 315.78
                                                                     95.81 102.17
91.32 376.33
90.38 679.09
                                                                                                98.05 134.12
91.01 436.88
90.12 739.64
                  91.31 557.98
91.23 790.27
91.94 852.61
                                            90.67 618.54
91.71 796.83
91.32 862.45
92.77 941.19
   497.43
747.62
                                                                                                                           89.71
                                                                      92.1 816.52
91.66 888.7
                                                                                                 91.55
                                                                                                            898.54
                                                                      91.6 960.87
92.89 1078.98
                  91.6 931.35
93.17 1016.65
                                            92.77 941.19
92.28 1052.73
   908 38
                                                                                                 91 99
                                                                                                            980 56
  1003.52
                                                                                                 92.04 1101.95
  1111.79
                  91.86 1131.47
                                            91.84 1141.31
                                                                      92.23
                                                                                    1161
                                                                                                 91.97 1206.93
                                                                                                                           92.29
                  92.78 1246.3
87.16 1387.37
87.26 1489.07
86.97 1666.24
                                                                      87.25 1426.74
87.25 1557.97
86.93 1715.45
                                            86.94 1407.06
87.06 1515.32
87.34 1679.36
                                                                                                86.93 1439.86
87.02 1580.94
87.07 1794.19
  1321.76
  1472.67
  1636.71
                  87.34 1889.33
88.99 1991.03
                                            87.23 1895.89
89.19 2036.96
                                                                      88.58 1925.42
89.38 2066.49
                                                                                                89.38 1931.98
89.22 2092.73
  1810.59
                                                                                                                             89 1
                                            89.59 2227.24
  2158.35
                  89.25 2207.56
                                                                      89.47 2299.42
                                                                                                 89.69 2365.03
                  89.45 2476.58
                                            89.86 2499.54
                                                                       89.72 2561.88
                                            89.62 2663.58
90.22 2847.3
93.83 2978.53
                  89.71 2630.77
89.74 2837.46
  2597.97
                                                                      89.78 2706.23
                                                                                                 89.62 2745.6
                                                                                                                           89.83
                                                                       89.93 2883.39
                  92.84 2952.28
                                                                      96.34 2988.37
                                                                                                 95.35 2998.21
   2932.6
                                                                                                                           95.35
                  88.75 3031.02
86.31 3172.09
                                            86.68 3040.86
86.29 3277.07
                                                                      86.92 3053.99
86.38 3349.25
                                                                                                86.56 3076.95
86.29 3391.9
  3014.62
  3109.76
  3418 14
                  86.55 3424.71
                                            86 33 3464 07
                                                                      86.51 3487.04
                                                                                                86.19 3506.72
                                                                                                                           86 58
                  86.73 3562.5
86.35 3772.46
                                            86.31 3585.46
86.53 3821.67
                                                                                                86.9 3621.55
86.54 3890.57
                                                                       86.43 3601.86
                                                                      86.32 3864.32
  3719.97
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                  86.49 4018.52
86.77 4169.43
                                            86.43 4038.2
87.41 4172.71
                                                                       86.76 4067.73
  4146.46
                                                                       87.87 4182.55
                                                                                                  91.8 4192.4
                                                                                                                           92.58
                                            92.01 4320.35
91.9 4431.89
92.03 4599.21
91.68 4819
90.58 4887.88
                                                                                                91.8 4192.4
92.16 4369.56
91.84 4507.35
92.19 4654.98
92.54 4864.92
84.2 4904.28
                  92.07 4307.22
92.2 4412.21
91.93 4543.44
  4225.2
4389.24
                                                                      91.86 4349.87
92.09 4454.86
                                                                      91.92 4641.86
92.02 4845.24
  4513.91
                                                                                                                           91 89
                  92.04 4753.39
                  94.13 4878.04
   4868.2
                                                                      88.74 4897.72
                                                                                                                           83.01
                  81.58 4930.52
55.62 4974.65
                                            77.15 4940.37
55.52 4988.65
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57.02 4999.65
                                                                                                68.96 4946.65
57.02 5008.65
  4962.65
                  58.22 5029.65
69.27 5137.18
                                            58.92 5040.65
74.54 5140.46
                                                                      58.92 5052.65
75.85 5153.58
                                                                                                59.48 5127.34
77.15 5173.27
  5019.65
  5130.62
                                           74.54 5140.46
89.08 5212.63
87.72 5307.76
88.74 5527.53
89 5740.75
88.52 5967.08
88.6 6180.3
89.86 6373.83
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                                                                                                86.7 5265.11
87.45 5442.25
89.26 5625.94
88.77 5812.91
88.33 6049.09
                                                                      87.69 5248.71
87.54 5356.96
  5186.39
                  88.34 5192.95
                  86.84 5288.07
                  88.38 5491.45
88.89 5675.15
88.64 5937.56
  5471.77
                                                                      88.88 5573.46
                                                                                                                           89.16
                                                                      88.57 5793.23
88.76 6009.73
  5904.76
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                  88.13 6150.77
88.95 6360.71
                                                                                                88.68 6229.5
92.95 6400.07
  6121.25
                                                                       88.74 6219.66
                                                                      90.69 6390.23
                                                                                                                             95.3
  6314.78
  6409.91
6534.56
                  95.79 6432.87
95.02 6570.64
                                            95.7 6445.99
93.94 6583.76
                                                                      93.95 6459.11
94.55 6632.96
                                                                                                94.18 6485.35
95.33 6688.73
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                                                                                                95.52 6869.14
95.52 6974.1
95.29 7144.67
                                                                      95.24 6859.3
95.2 6957.7
  6714 97
                  95 42 6747 77
                                            95.58 6774.01
                                                                                                                           95 26
                                            95.47 6938.02
95.27 7085.63
94.93 7239.8
94.68 7416.93
                  95.05 6931.46
95.66 7065.95
                                                                      95.76 7111.87
  7023.31
                  95.63 7190.6
94.28 7393.97
                                                                      94.56 7246.36
94.24 7475.97
                                                                                                 94.25 7295.56
93.95 7505.5
  7167.64
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  7328.37
                                                                                                93.36 7758.07
92.81 7974.56
92.49 8253.38
92.7 8394.42
91.73 8486.27
                                            93.74 7633.42
93.21 7889.28
                                                                      93.56 7728.55
93.39 7941.76
  7564.54
                  93.65
                             7587.5
                                                                                                                           93 52
                  93.28 7856.48
                                                                                                                           92.69
                                            92.51 8171.38
92.57 8322.26
  8092 65
                  92 71 8132 01
                                                                       92 76
                                                                                8184 5
                                                                                                                           92 51
                                                                       92.15 8355.06
  8407.54
                  93.11 8430.51
                                              91.9 8453.47
                                                                       91.98 8469.87
                                                                                                                           92.38
                  91.73 8532.19
92.73 8617.47
                                            91.55 8542.03
92.43 8630.59
                                                                      92.79 8564.99
93.14 8673.24
                                                                                                 92.34 8591.23
93.39 8686.36
  8604.35
  8706.04
                  93.38 8712.6
93.32 8935.65
                                            93.06 8751.96
                                                                      92.97 8807.72
93.3 9014.37
                                                                                                93.42 8860.2
93.56 9040.61
                                            93.39 9096.37
92.81 9270.22
93.85 9401.42
                                                                                                93.44 9171.81
93.51 9306.3
94.36 9430.94
                                                                      93.56 9139.01
92.89 9286.62
  9057 01
                  93.87 9070.13
                                                                                                                           94 43
                  93.54 9362.06
                                                                      93.91 9421.1
90.61 9489.99
91.2 9621.19
  9345.66
                                                                                                                           93.86
                                                                                                91.92 9509.67
91.42 9673.67
91.27 9762.24
89.9210044.33
 9447.34
9529.35
                  91.4 9467.03
91.52 9555.59
                                            90.41 9476.87
91.73 9588.39
                                                                                                                           90.63
 9693.35
9788.48
                  91.35 9703.19
90.4 9850.8
                                            90.89 9722.88
90.48 9913.12
                                                                      90.73 9745.84
90.14 9991.85
                                            89.9510086.97
90.2810287.06
                  89.6710067.29
10050.89
                                                                      89.7610168.97
                                                                                                 89.8610185.37
                                                                                                                           90.11
                                                                        90.110300.18
                                                                                                 90.2110352.66
                  90.1110244.42
10365.78
                  90.1810418.26
                                            89.7910441.22
                                                                      89.9110490.42
                                                                                                 89.7310552.75
                                                                                                                           89.75
                                            89.3810742.99
87.6311116.93
                                                                      88.9810785.63
87.1311126.77
                                                                                                88.86 10874.2
86.9711346.54
                  88.1710982.44
     10907
11362.94
                  87.7511379.34
93.1811477.74
                                            90.3611399.02
93.14 11517.1
                                                                      92.4411415.42
93.57 11533.5
                                                                                                 95.19 11451.5
93.4511543.34
                                            94.5311585.99
9511746.71
94.9711871.36
                                                                        94.311595.83
11559.74
                  93.7711576.15
                                                                                                 95.0811605.67
11802 47
                  94 8211828 71
                                                                      94 6211917 28
                                                                                                  94 711933 68
                                                                                                                           94 47
                                            93.2312064.88
93.1312314.17
12146.89
                  93.0112245.29
                                                                      92.9212333.85
                                                                                                  93.112366.66
                                                                                                                           92.86
                  92.8512448.66
                                             92.7 12474.9
92.912694.67
                                                                      92.8812494.58
                                                                                                92.69 12573.3
93.0812799.63
12609.38
                  93.3812655.31
                                                                      93.2712714.35
                                                                                                                           93.61
                                            93.2812861.95
                                                                                                93.5212960.36
92.8913209.65
12822.59
                  93.6612829.15
                                                                      93.28 12937.4
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92.2713350.69
                                                                                                                               92.3213386.77
                                                                                                                                                                               91.8613429.42
13458.94
13567.18
                                91.4513524.54
                                                                               91.3113534.38
                                                                                                                              92.4113540.94
                                                                                                                                                                              92.22 13547.5
89.2913760.71
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                                                                                                                                                                                                                              90.63
 13800.07
                                 89.8613839.43
                                                                                89.9913885.35
                                                                                                                               90.3313911.59
                                                                                                                                                                               90.3513937.83
 13987.04
                                 90.5714013.28
                                                                                90.7914039.52
                                                                                                                               90.3914052.64
                                                                                                                                                                               90.48 14059.2
                                                                                                                                                                                                                              91.34
 14065.76
                                90.1814072.32
                                                                                91.3514078.88
                                                                                                                              90.5314105.12
                                                                                                                                                                               90.7814118.24
                                                                                                                                                                                                                              90.62
                                90.6714167.44
90.7314557.78
                                                                               90.3714285.53
90.5214600.42
 14160.88
                                                                                                                               90.1214423.29
                                                                                                                                                                               90.3414442.97
 14534.82
                                                                                                                              89.6614606.98
                                                                                                                                                                              89.0614610.26
 14623.38
                                90.8814633.22
                                                                               93.24 14652.9
                                                                                                                              95.4614662.74
                                                                                                                                                                              97.1114672.58
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val
0 .066 4930.52 .066 4943.65 .015 5
                                                                                                                                                                             n Val
                                                                                                                                                            Sta
                                                                                                                                                                                                                             n Val
                                                                                                                                                                                .066 5904.76
                                                                                                                                .015 5130.62
Bank Sta: Left Right Lengths: Left Channel Right 4887.88 5186.39 1658.45 1444.91 1082.27 Ineffective Flow num= 2 Sta L Sta R Elev Permanent 0 4887.88 88.74 T 5186.3914695.54 88.34 T Left Levee Station= 134.12 Elevation= 99.96 Right Levee Station=14672.58 Elevation= 99.74
                                                                                                                                                                                Coeff Contr.
                                                                                                                                                                                                                              Expan.
                                                                                                         Elevation= 99.96
Elevation= 99.74
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev | Vel Head (ft) | W.S. Elev (ft) | 84.69 | Crit W.S. (ft) | 0.000047 | 125000.00 | 125000.00 | 14695.54 | 0.77 | 70.99 | 125000.00 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 14695.54 | 
                                                                            101.93
                                                                                                                                                                                           Left OB
      E.G. Elev (ft)
                                                                                                                Element
                                                                                                                                                                                                                          Channel
                                                                                                                                                                                                                                                          Right OB
                                                                                                              Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                                                                                                                          0.066
1658.45
                                                                                                                                                                                                                          0.038
1444.91
                                                                                                                                                                                                                                                           0.085
                                                                                                                                                                                       55856.94
                                                                                                                                                                                                                       10260.54
                                                                                                                                                                                                                                                         95998 59
                                                                                                                                                                                       59462.59
                                                                                                                                                                                                                     10260.54
                                                                                                                                                                                                                                                        96718.86
                                                                                                                                                                                          43552.26 27415.54
                                                                                                              Flow (cfs)
Top Width (ft)
                                                                                                                                                                                                                                                           54032.21
                                                                                                               Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                      0.77
                                                                                                                                                                                           0.78
11.43
                                                                                                                                                                                                                                2.67
                                                                                                                                                                                                                                                                  0.56
      Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                                                                                                                                                                10.10
7900547.0
                                                                           18277400.0
                                                                                                              Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                                                                                                4008678.0
                                                                                                                                                                                              6368176.0
                                                                                                                                                                                                                            320.43
                                                                                                                                                                                        4901.71
                                                                                                                                                                                                                                                            9515.69
                                                                               1369.47
                                                                                                                                                                                                                                                             0.03
      Min Ch El (ft)
                                                                                     53.91
      Alpha
                                                                                        3.22
                                                                                                                                                                                                   0.03
                                                                                                                                                                                                                                   0.25
                                                                                                                                                                                                                                                                    0.02
                                                                                                                Cum Volume (acre-ft)
      Frctn Loss (ft)
      C & E Loss (ft)
                                                                                       0.00
                                                                                                            Cum SA (acres)
                                                                                                                                                                                      12515.77
                                                                                                                                                                                                                          1666.72
                                                                                                                                                                                                                                                     13807.13
```

Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 145.2

Description: RGV-01, new cross-section, Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with

| | 2017 survey | | | | _ | | _ | |
|-----------|---------------|-------|---------|-------|---------|-------|----------|--------|
| Station E | levation Data | num= | 447 | | | | | |
| Sta | Elev Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 92.67 35.09 | 92.76 | 70.19 | 94.02 | 110.14 | 96.79 | 150.1 | 100.18 |
| 210.71 | 96.7 271.31 | 92.72 | 331.92 | 93.1 | 392.53 | 93.16 | 453.14 | 93.23 |
| | | | | | | | | |
| 513.75 | 93.31 574.36 | 93.42 | 634.96 | 93.54 | 695.57 | 93.62 | 756.18 | 93.7 |
| 779.9 | 94.79 793.02 | 95.11 | 838.95 | 94.74 | 865.19 | 95.1 | 881.59 | 94.82 |
| 894.71 | 95.16 914.39 | 95.01 | 937.35 | 96.25 | 950.47 | 96 | 966.88 | 96.37 |
| 1006.24 | 96.26 1025.92 | | 1032.48 | | 1052.16 | 94.92 | 1084.96 | 94.99 |
| 1101.36 | 94.4 1117.77 | 94.74 | 1140.73 | 95.96 | 1183.37 | 94.83 | 1193.21 | 95.53 |
| 1206.33 | 95.18 1219.45 | 95.63 | 1229.29 | 95.03 | 1258.81 | 95.36 | 1268.66 | 95.85 |
| 1301.46 | 95.09 1324.42 | 95.9 | 1344.1 | 95.27 | 1363.78 | 96.17 | 1373.62 | 95.05 |
| 1393.3 | 94.61 1406.42 | 95.04 | 1412.98 | 94.42 | 1439.23 | | 1455.63 | 95.45 |
| 1468.75 | 94.37 1488.43 | | 1494.99 | 94.65 | 1504.83 | | 1524.51 | 94.62 |
| 1537.63 | 94.13 1570.44 | | 1583.56 | | 1599.96 | | 1639.32 | 93.69 |
| 1659 | 93.33 1678.68 | 93.48 | 1691.8 | 94.16 | 1724.6 | | 1741.01 | 94.13 |
| 1750.85 | 93.24 1790.21 | | 1819.73 | | 1836.13 | | 1845.97 | 94.52 |
| 1859.09 | 93.38 1895.18 | | 1927.98 | 93.57 | 1941.1 | | 1970.62 | 93.24 |
| | 92.87 2042.79 | | | | 2075.59 | | 2114.95 | |
| 1983.74 | | | 2062.47 | | | | | 93.11 |
| 2144.48 | 92.6 2167.44 | 92.91 | 2190.4 | | 2226.48 | | 2265.85 | 89.98 |
| 2328.17 | 90.57 2338.01 | | 2360.98 | | 2370.82 | | 2416.74 | 90.37 |
| 2433.14 | 88.93 2442.98 | | 2472.51 | | 2479.07 | | 2502.03 | 91.21 |
| 2534.83 | 92.3 2544.67 | 89.86 | 2551.23 | | 2557.79 | 92.07 | 2626.68 | 92.08 |
| 2652.92 | 92.62 2659.48 | 92.45 | 2734.93 | 92.53 | 2744.77 | 92.82 | 2764.45 | 92.53 |
| 2797.26 | 92.71 2813.66 | 92.47 | 2859.58 | 92.7 | 2875.99 | 92.5 | 2957.99 | 92.98 |
| 2980.96 | 92.53 2997.36 | 93.15 | 3003.92 | 92.31 | 3013.76 | 93.97 | 3030.16 | 95.94 |
| 3043.28 | 96.16 3049.84 | 93.23 | 3059.68 | 94.08 | 3072.8 | 89.58 | 3085.93 | 87.1 |
| 3099.05 | 86.51 3118.73 | 87.1 | 3128.57 | 86.76 | 3144.97 | 87.56 | 3151.53 | 87.06 |
| 3171.21 | 86.85 3177.77 | 88.3 | 3194.18 | 88.82 | 3213.86 | 86.58 | 3230.26 | 86.84 |
| 3249.94 | 86.55 3272.9 | 87.07 | 3282.74 | 86.3 | 3295.87 | 87.08 | 3345.07 | 87.16 |
| 3358.19 | 87.6 3371.31 | 87.18 | 3492.68 | 87.15 | 3499.24 | 87.35 | 3574.69 | 87.39 |
| 3604.21 | 87.58 3735.43 | | 3755.11 | | 3899.44 | | 3942.09 | 87.89 |
| 3951.93 | 87.71 4060.18 | | 4079.86 | | 4129.06 | | 4178.27 | 87.83 |
| 4227.47 | 87.99 4306.2 | | 4325.88 | | 4348.84 | | 4394.77 | 88.07 |
| 4427.57 | 88.23 4434.13 | 88.67 | 4457.1 | | 4493.18 | | 4529.26 | 88.8 |
| 4598.15 | 88.37 4653.91 | | 4676.88 | | 4775.28 | | 4794.97 | 88.68 |
| 4817.93 | 88.38 4857.29 | 88.61 | 4906.5 | | 4978.66 | | 5014.75 | 88.76 |
| 5060.67 | 88.55 5086.91 | | 5103.31 | | 5149.24 | | 5178.76 | 88.6 |
| | | | | | | | | |
| 5247.65 | 88.92 5267.33 | | 5287.01 | | 5329.65 | | 5352.62 | 89.28 |
| 5385.42 | 89.08 5428.06 | | 5496.95 | | 5519.91 | | 5562.56 | 89.31 |
| 5647.84 | 89.18 5693.77 | | 5703.61 | | 5719.98 | | 5739.62 | 89.71 |
| 5759.26 | 89.53 5831.27 | | 5886.91 | | 5932.73 | | 5994.92 | 90.08 |
| 6014.56 | 89.88 6047.29 | | 6053.84 | | 6070.21 | | 6086.57 | 89.88 |
| 6093.12 | 89.68 6119.3 | | 6142.22 | | 6165.13 | | 6181.49 | 88.61 |
| 6204.41 | 87.53 6217.5 | | 6240.41 | | 6260.05 | | 6263.32 | 68.64 |
| 6270.68 | 67.86 6326.36 | | 6336.94 | | 6372.43 | 61.04 | 6381.27 | 61.25 |
| 6386.44 | 64.44 6391.93 | 65.34 | 6400.16 | 68.65 | 6433.52 | 68.61 | 6436.8 | 68.99 |
| 6449.89 | 77.06 6453.16 | 77.81 | 6462.98 | 74.71 | 6469.53 | 73.58 | 6476.08 | 73.81 |
| 6482.62 | 75.79 6495.71 | 82.24 | 6502.26 | 84.07 | 6512.08 | 84.25 | 6528.45 | 86.55 |
| 6538.27 | 85.84 6580.82 | 84.57 | 6616.82 | 85.47 | 6633.19 | 85.57 | 6646.28 | 84.79 |
| 6692.1 | 83.27 6724.83 | 83.49 | 6747.75 | 82.91 | 6777.2 | | 6800.12 | 86.51 |
| 6826.3 | 89.81 6842.67 | | 6881.94 | | 6901.58 | | 6934.32 | 95.56 |
| 6947.43 | 95.82 6973.67 | 95.62 | 6983.5 | 94.8 | 6999.9 | | 7019.58 | 94.93 |
| 7072.06 | 95.3 7078.62 | | 7088.46 | | 7101.58 | | 7134.37 | 95 |
| 7180.29 | 95.58 7196.69 | | 7249.17 | | 7272.12 | | 7285.24 | 95.47 |
| 7347.56 | 95.33 7380.36 | 95.56 | 7390.2 | | 7429.55 | | 7491.87 | 95.24 |
| 1341.30 | 22.33 /300.30 | 20.00 | 1390.2 | 20.3/ | 1447.05 | 90.02 | / 471.0/ | JJ.∠4 |

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95.05 7619.78
                                                                                   94.76 7836.24
 7708.33
               94.94 7724.73
                                      94.81 7800.17
                                                             94.98 7813.29
                                                                                                          95.02
                                                                                                          93.94
 8019.91
               94.21 8065.83
                                      93.81 8072.39
                                                             93.93 8147.82
                                                                                    93.67 8190.46
 8206.86
               93.62 8239.66
                                      94.16 8262.62
                                                             93.75 8285.58
                                                                                    93.74 8292.15
                                                                                                          93.23
 8338.07
               92.76 8361.03
                                      91.99 8397.11
                                                             91.65 8423.35
                                                                                   91.13 8439.76
                                                                                                          92.15
                                      88.68 8472.56
88.16 9361.5
                                                            87.9 9102.36
87.92 9404.14
                                                                                    87.9 9217.17
87.9 9820.73
                            8466
               88.22 9335.26
                                      88.16 9361.5
90.95 9932.26
 9253.25
 9856.82
               90.58
                        9909.3
                                                            91.46 9951.94
91.8910089.71
                                                                                   90.74 9971.62
91.8910122.52
                                                                                                           90.9
                91.4510017.55
                                                                                   92.3210201.24
91.8410289.81
10132.36
               92.1610155.32
                                      91.5710165.16
                                                             92.1510188.12
                                                                                                          91.98
               92.410237.32
91.7910312.77
                                      92.0810260.29
91.710339.01
10299.65
                                                             92.3310355.41
                                                                                   92.1610365.25
                                                                                                          92.54
               92.38 10391.5
                                      91.8710450.54
90.1910686.72
                                                                                   91.610509.58
89.5510778.56
10384.93
                                                            92.1610460.38
                                                                                                          91 62
10565.35
               90.3110611.27
                                                            90.2610735.92
                                                                                                          89.57
                                                                                   91.2610975.38
9111093.46
86.9711503.49
10817.92
               89.8110850.73
91.1711008.18
                                      89.7110932.73
91.0711014.74
                                                            90.1610962.26
91.6411040.98
               89.0511136.11
95.58 11569.1
95.7111729.83
                                                            86.9711496.93
96.0311637.98
11119.71
                                       88.811145.95
                                                                                                           87.1
                                      95.4411605.18
95.6711746.23
                                                                                   95.7911647.82
95.7811769.19
11680.63
                                                            96.2411759.35
                                                                                                          96.18
                                      95.6/11/46.23
95.9211815.12
95.02 11884
94.4711992.25
92.4812156.26
92.7912412.12
93.4412461.32
               95.1711792.15
95.5211861.04
                                                            95.2111821.68
95.1811897.12
                                                                                   95.5811838.08
94.7511923.36
11782.31
11854.48
                                                            94.6912011.93
92.6512175.94
93.7512421.96
               94.6511975.85
92.8812080.82
                                                                                   94.2812031.61
92.3612254.67
11936.49
12057.85
               92.5712408.84
99.7912454.76
12385.88
                                                                                   99.6712425.24
                                                            93.0112871.35
12674.54
               92.8112789.35
                                      93.0812825.43
                                                                                   93.1612956.64
13032 08
               93.2413094.41
93.4513376.51
                                      93.1113182.97
92.8513383.07
                                                            93.213232.18
93.2813412.59
                                                                                   93.5913291.22
92.4413448.67
13363.39
               92.05 13527.4
89.6713724.21
                                                                                   91.56 13593
89.3113917.75
13468 35
                                      91.87 13576.6
                                                              91.913586.44
                                                                                                          90.48
                                      89.6713822.62
 13625.8
                                                             89.1213855.42
                                                                                                          89.08
               89.3813996.47
89.7414144.08
13980.07
                                      88.8414019.43
                                                            88.7414045.67
                                                                                    89.3714055.52
                                                                                                          89.23
               88.9214301.53
14275.29
                                       89.4 14324.5
                                                             89.08 14357.3
                                                                                       90 14390.1
                                                                                                          89.79
               89.2814442.58
97.7914596.75
                                                                                   90.5114554.11
14413.06
                                      89.0114514.75
                                                             88.9714531.15
                                      98.8214613.16
                                                                9914619.72
14573.79
                                                                                   98.1614629.56
                                                                                                         94.44
 14639 4
              93 3714698 44
Manning's n Values
                                    num=
                                                           n Val
      Sta n Val Sta
0 .066 6165.13
                             Sta n Val Sta n Val Sta
5.13 .066 6204.41 .015 6381.27
                                                                                    .066 6391.93
                                                                                                           .088
Bank Sta: Left
                                    Lengths: Left Channel
                                                                                    Coeff Contr.
                       Right
                                                                       Right
                                                                                                          Expan.

        Bank Sta: Lett
        Night

        6204.41 6528.45
        920

        Ineffective Flow
        num=

        Sta L
        Sta R
        Elev
        Permanent

                                              920.68 1243.87 995.11
    Sta L Sta R
0 6204.41
6528.4514698.44 86.55 T
Left Levee Station= 150.1
Right Levee Station=14613.16
                                                     Elevation= 100.18
                                                 Elevation=
Blocked Obstructions
Sta L Sta R Elev
1455.63 3043.28 95.45
CROSS SECTION OUTPUT Profile #Design Flow
                                    101.85
  E.G. Elev (ft)
                                                     Element
                                                                                          Left OB
                                                                                                        Channel
                                                                                                                        Right OB
                                                     Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
                                                                                          0.066
920.68
                                                                                                        0.054
1243.87
                                                                                                                         0.088
  W.S. Elev (ft)
Crit W.S. (ft)
E.G. Slope (ft/ft)
                                      101.83
                                                                                                        9847.26
9847.26
                                         91 16
                                                                                       62544 81
                                                                                                                       85460 48
                                                                                       62762.70
51217.08
  O Total (cfs)
                                    125000.00
                                                      Flow (cfs)
                                                                                                        20001.29
                                                                                                                        53781.64
  Top Width (ft)
Vel Total (ft/s)
                                                     Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                          324.04
                                    14698.44
                                         0.79
                                                                                             0.82
                                                                                                            2.03
                                                                                                                            0.63
                                    0.79
42.66
16019440.0
                                                                                         10.08
  Max Chl Dpth (ft)
                                                                                                           30.39
                                                                                                                           10 46
                                                                                                           2563276.0
                                                     Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                           6563751.0
  Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                                            6892413.0
                                                                                                         335.71
                                      1002.89
                                                                                         6217.20
                                                                                                                        8187.01
  Min Ch El (ft)
                                         59.17
                                                                                          0.04
  Alpha
                                          1.76
                                                     Stream Power (lb/ft s)
                                                                                             0.03
                                                                                                             0.23
                                                                                                                             0.02
                                                     Cum Volume (acre-ft)
                                                                                       78705.52
                                                                                                       35923.88
  C & E Loss (ft)
                                                                                       12304.61
                                          0.00
                                                     Cum SA (acres)
                                                                                                       1656.39
                                                                                                                      13587.51
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
Note:
            Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                    RS: 145
REACH: Lower Reach
Description: RGV-01, Updated on left with new survey to Station 1176.05.
                  Bathymetric elevations translated from
                  Section along left levee updated with 2017 survey
Station Elevation Data

Sta Elev Sta
0 92.18 22.92
77.75 97.65 108.65
168.46 97.74 198.36
281.12 93.74 323.12
                                              421
                                    num=
                                                   Sta
                                      91.61 31.9
96.81 122.61
                                                          92.25 42.86
100.81 132.57
                                                                                  91.31 62.8
105.02 149.52
                                                                                                        91.81
104.74
                                      89.39 211.32
                                                            89.99 234.25
                                                                                   94.08 242.22
                                                                                                          94.39
                                                                                             483.11
764.08
                                               363.12
                                                             93.53
                                                                       403.11
                                                                                    93.22
               93.43
                                      93.58
    526.1
                          563.1
                                               645.09
                                                             93.44
                                                                       685.09
                                                                                    93.62
  893.07
               93.32 966.07
95.83 1228.43
                                      93.55 1044.06
95.39 1238.27
                                                             93.62 1086.06
96.36 1248.11
                                                                                   93.83 1176.05
94.66 1257.95
   1202.2
                                      94.9 1300.58
90.67 1435.03
                                                                                   94.8 1326.81
91.03 1500.62
 1267.78
               95.81 1284.18
                                                             95.53 1316.97
  1349.77
                   91 1392.4
                                                             90.68 1454.71
 1536.69
               90.98 1576.05
                                      90.68 1605.56
                                                             90.96 1644.91
                                                                                    90.76 1703.94
                                      90.94 1825.28
91.05 2058.12
                                                            90.72 1890.87
91.25 2064.68
```

91.04 2107.31

91.12 2395.9 91.19 2635.3

91.71 2973.08

92.44 3294.47 92.73 3458.44

92.98 3586.34

92.97 3651.92 86.29 3773.26

86.73 4081.53

92.02

92 69

93.25

91.38 1999.09

91.08 2159.78 91.14 2530.36

91.42 2750.08

92.35 2992.76

93.1 3255.11 92.15 3376.45

92.8 3533.86

96.68 3619.13 87.67 3668.32

86.31 3920.84

91.27 2205.69 91.56 2536.92

91.74 2855.02 91.75 3032.11

93.33 3271.51

92.17 3435.48 92.79 3546.98

96.74 3635.53 86.52 3684.72

86.44 4009.38 87.3 4137.28

91.29 2271.28 91.32 2576.27

91.9 2891.09 92 3133.77

93.85 3284.63

92.35 3448.6 93.1 3573.22

93.52 3645.37 87.18 3704.4

86.26 4052.02 86.82 4166.79

1972.85 2126.99 2458.21

2700.89

3209.2 3320.7

3504.35

3599.45

3661.76

3901.16

```
87.06 4317.64
                                                                                     86.67 4330.76
 4360.28
                86.51 4416.02
                                       87.43 4438.98
                                                              88.14 4494.73
87.73 4773.47
                                                                                     88.57 4530.8
88.36 4802.99
                                                                                                            88.33
                                       88.03 4940.72
 4871.85
                88.21 4914.48
                                                              88.28 4986.63
                                                                                      88.03 5025.98
                                                                                                            88.15
                                                              88.1 5147.32
88.57 5360.48
 5058.78
                87.95 5085.01
                                       88.47 5124.36
                                                                                      88.41 5183.39
 5235.86
                88.14 5298.17
                                      88.62 5340.8
88.48 5435.9
                                                                                     88.35 5389.99
                                                                                                            88.49
               88.81 5416.23
88.52 5583.47
                                      88.48 5435.9
88.62 5599.87
                                                              88.64 5478.53
89.03 5678.57
                                                                                     88.49 5491.65
88.79 5704.81
 5399.83
 5544.12
   5737.6
                89.17 5763.84
                                      88.88 5832.7
89.33 5963.88
                                                              89.05
                                                                       5849.1
                                                                                      89.33 5901.57
                                                              89.67 6016.35
               89.66 6078.65
87.14 6186.87
85.04 6314.75
 6065.54
                                          86 6098.33
                                                              85.75 6104.89
                                                                                     85.22 6150.8
                                                                                                            86.55
                                      87.19 6222.94
86.01 6347.51
                                                              86.06 6242.62
86.81 6354.06
                                                                                     85.8 6265.58
86.44 6376.99
 6288.53
               87.98 6432.67
89.41 6553.87
                                      88.01 6458.88
88.35 6566.97
                                                              88.52 6485.08
89.24 6593.18
                                                                                     88.55 6491.63
88.77 6606.28
 6413.02
                                                                                                            89 13
 6521.11
                                                                                                            89.22
                                                                                     88.53 6740.58
91.17 6809.37
90.07 6930.57
87.75 6999.35
84.41 7087.79
 6619.38
                 88.9 6671.79
                                      88.77 6688.17
90.21 6786.44
                                                              88.42 6720.93
91.09 6799.54
                                                                                                            88.99
                                      90.09 6878.16
89.56 6963.32
86.93 7041.94
                                                              91 6907.64
88.03 6979.7
86.86 7061.59
               89.14 6848.67
89.77 6953.49
 6835.57
                                                                                                            88.97
 7012.46
                88.93 7028.83
                                                                                                            84.48
               86.52 7127.1
77.39 7228.65
                                      82.5 7136.93
75.77 7235.2
                                                              80.77 7156.58
75.76 7245.02
                                                                                     79.48 7182.79
77.13 7254.85
  7110 72
  7208.99
                                                                                                            80.39
                                      75.77 7235.2
83.1 7297.43
67.4 7343.64
63.4 7443.64
82.06 7520.17
91.37 7683.96
                                                                                     75.52 7313.81
66.1 7383.64
66.7 7480.87
92.03 7582.41
94.19 7782.22
               81 7287.61
68.37 7333.64
                                                              80.23 7307.26
66.9 7363.64
 7267.95
                                                              66.9 7363.64
63.9 7453.64
91.14 7523.45
91.85 7742.92
94.78 7877.22
93.82 8037.78
               64 7423.64
68.76 7503.8
91.35 7651.2
 7403.64
                                                                                                            68.37
 7628.27
                                                                                                                 95
  7792.05
               94.53 7831.36
93.79 7975.48
                                      94.33 7847.73
93.54 8001.69
                                                                                     94.21 7893.59
93.87 8047.62
                                                                                                            94 34
  7916.52
 8057.46
                 90.6 8073.87
                                       88.94 8106.67
                                                              88.55 8198.54
                                                                                     89.25 8237.91
                                                                                                            88 97
                                       89.95 8408.52
                89.44 8382.27
                                                               89.8 8470.86
                                                                                     90.05 8552.88
               89.71 8611.94
89.8 8753.02
                                      90.16 8625.06
89.78 8772.71
                                                                                     90.01 8671
90.23 8838.33
 8598.82
                                                              89.85 8648.03
                                                                                                            89.62
                                                              91.97 9117.21
 8874.42
                90.54 8985.97
                                       91.19 9081.12
                                                                                     92.18 9205.79
                                                                                                            91.97
               92.18 9310.78
90.26 9606.07
                                      91.97 9389.53
89.95 9638.88
                                                              91.88 9491.24
89.87 9684.81
                                                                                     91.14 9550.29
89.37 9734.03
 9589.67
                88.3 9816.05
92.46 9973.54
                                      88.24 9839.02
91.9610035.88
92.3210111.34
                                                              87.9 9907.92
91.8610045.72
 9786 52
                                                                                      87.9 9930.89
                                                                                                            88 66
                                                                                     91.5410055.57
10058.85
               94.5810065.41
                                                              92.4710190.09
                                                                                     92.3510199.93
                                                                                                            92.58
                                      91.77 10377.1
90.9210524.75
89.9510800.35
89.3410934.87
                 9210341.01
90.910482.09
                                                              91.3710396.79
                                                                                     90.4810646.14
89.4910846.28
89.2411013.61
10452.57
                                                              90.1910564.12
                                                                                                            89.69
10688.8
               89.4810708.48
89.4310915.18
                                                              89.210829.88
89.6510970.96
                                                                                                            89.48
                                                              88.1811217.03
87.9311630.43
93.7711696.05
                                      88.6811164.54
87.9311597.62
                                                                                    88.3311236.72
89.1611643.56
11079.23
                89.2211105.48
                88.4911269.53
11659.96
               94.2811679.65
                                        94.311689.49
                                                                                      94.311725.58
                                                                                                            94.45
                                       93.6111787.92
                                                              94.2511804.32
                                                                                     94.0111830.57
                                      93.9311984.78
92.2212332.56
92.312627.85
                                                              93.47 12050.4
90.7812371.93
92.2512683.63
11883.07
                93.8111896.19
                                                                                      93.4 12119.3
                                                                                                              92.9
12522.86
               91.9712575.35
                                                                                     92.6612696.75
                                                                                                              92.5
 12739.4
               92.8112755.81
93.9612821.43
                                      92.7112801.74
92.7312841.11
                                                                                     93.7412811.59
92.5412896.89
                                                              92.95 12808.3
                                                                                                            92.49
                                                              93.3212854.24
12818.15
               92.513097.03
92.77 13326.7
92.5913605.58
13064 22
                                       92 7713123 28
                                                              92 5513211 87
                                                                                      92 69 13257 8
                                                                                                            92 53
                                                              92.6813546.52
92.4713615.42
                                                                                     92.7913569.49
93.2213628.55
 13602.3
                                       93.4313612.14
                                                                                                            92.86
                92.9213782.75
                                       92.6713841.81
                                                              91.7613854.93
13959.92
               90.2614028.83
                                       89.6614061.63
                                                              89.2114123.97
                                                                                       88.7 14222.4
                                                                                                            88.22
14304 43
                88.3914366.76
                                       88.1314393.01
                                                              88.3314438.95
                                                                                      88.3414448.79
                91.6214484.88
                                       93.2414501.29
                                                               96.514520.97
14461.91
                                                                                      99.1514540.66
                                                                                                            99.36
                                      93.3414662.05
97.4214744.08
                                                              93.34 14671.9
93.9314770.33
14543 94
               98 6914557 06
                                                                                      93 9414678 46
                98.1214714.55
14839.23
               92.13
Manning's n Values num:-
n Val Sta n Val
                                      n Val Sta
.066 7307.26
                                                             n Val
            n Val Sta
.066 7061.59
                                                                                     n Val
                                                             .015 7484.14
                                                                                      .066 7520.17
                                                                                                              .088
Bank Sta: Left
                        Right
                                     Lengths: Left Channel
                                                                                      Coeff Contr.
                                                                                                            Expan.
                      7523.45 1054.14 1745.3 2394.82 Station= 132.57 Elevation= 105.02 Station=14540.66 Elevation= 0.000
          7110.72 7523.45
Left Levee
                      Station=14540.66
Right Levee
                                                      Elevation=
                                                                         99.36
| Sta L | Sta R | Elev | Sta L | Sta R | 1238.27 | 3596.62 | 92.3611984.7814494.65
                                                           92.92
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                       101.80
                                                      Element
                                                                                            Left OB
                                                                                                           Channel
                                                                                                                           Right OB
   Vel Head (ft)
W.S. Elev (ft)
                                                      Wt. n-Val.
Reach Len. (ft)
                                                                                           0.066
1054.14
                                    0.02
101.78
                                                                                                          0.048
1745.30
                                                      Flow Area (sq ft)
Area (sq ft)
                                                                                          78825.87
   Crit W.S. (ft)
                                         90 90
                                                                                                         11388.31
                                                                                                                          73924 59
   E.G. Slope (ft/ft) 0.000049
                                                                                         78825.87
                                                                                                         11388.31
                                                                                                                         73924.59
                                                      Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
                                                                                           62505 07
   O Total (cfs)
                                     125000.00
                                                                                                           21842 95
                                                                                                                           40651 97
   Top Width (ft)
Vel Total (ft/s)
                                     14681.70
                                                                                                            412.73
                                                                                                                           7315.78
                                          0.76
                                                                                               0.79
                                                                                                              1.92
                                                                                                                               0.55
                                                      Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
   Max Chl Dpth (ft)
Conv. Total (cfs)
                                          38.38
                                                                                                             27.59
                                                                                                                              10.10
                                     17914750.0
                                                                                                                               5826159.0
                                                                                             8958101.0
                                                                                                              3130487.0
   Length Wtd. (ft)
Min Ch El (ft)
                                    1730.88
                                                                                           6959.88
                                                                                                            424.90
                                                                                                                           7331.08
                                                                                                             0.08
   Alpha
                                          1.82
                                                       Stream Power (lb/ft s)
                                                                                               0.03
                                                                                                               0.16
                                                                                                                               0.02
                                                       Cum Volume (acre-ft)
   Frctn Loss (ft)
   C & E Loss (ft)
                                           0.00
                                                      Cum SA (acres)
                                                                                         12165.56
                                                                                                           1645.87
                                                                                                                         13410.63
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
Note:
            Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                     RS: 144.7
REACH: Lower Reach
Description: RGV-01, new cross-section, Bathymetric elevations translated from
IBWC 2008 Cross-sections, Section along left levee updated with
                   2017 survey
Station Elevation Data
Sta Elev Sta
                                     Elev Sta
91.98 70.24
94.98 322.29
      Sta Elev
0 91.97
                                                               Elev
                                                                            Sta
                                                                                       Elev
```

35.12

91.99 113.27 92.76 383.77

93.05 156.29

| 506.74 | | | | | | |
|--|--|--|--|---|---|---|
| | 94 568.22 | 93.31 629.71 | 92.99 691.19 | 92.95 752.68 | 92.91 | |
| 769.96
842.11 | 94.01 796.2
94.73 861.79 | 94.67 809.32
94.47 917.54 | 94.1 815.87
94.91 963.45 | 94.7 835.55
94.93 970.01 | 94.32
94.59 | |
| 999.53 | 95.32 1012.65 | 95.09 1032.32 | 95.42 1042.16 | 96.12 1058.56 | 95.15 | |
| 1071.68 | 95.54 1081.52 | 95.04 1091.36 | 95.42 1137.27 | 95.51 1160.23 | 95.38 | |
| 1166.79
1327.49 | 95.85 1173.35
95.62 1350.44 | 95.29 1222.54
96.96 1360.28 | 95.7 1242.22
96.34 1379.96 | 95.29 1288.13
95.97 1393.08 | 95.19
96.33 | |
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90.86 | |
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| 12510.22 12647.96 12697.14 12903.74 13208.23 13405.47 13608.79 13854.74 14061.33 14244.97 14330.23 14389.26 14546.67 14635.21 Manning's Sta 0 Bank Sta: 641 Ineffectiv Sta L 0 6 Left Levee Right Leve Blocked Ob Sta L 0 5 | 91.5812038.01 90.5112195.41 91.2312375.77 92.212520.06 92.5912657.79 92.6412733.22 92.9 12926.7 92.413415.31 92.6213657.98 91.1413884.25 88.5514136.76 87.214258.09 92.2514340.07 97.114395.82 96.4214576.18 91.98 n Values n Val Sta .09 6469.72 Left Right 3.97 6709.12 re Flow num= Sta R Elev 413.97 88.7 12 Station= 12 Station= 12 Station= 13 Station= 14 Station= 15 Station= 16 Station= 17 Station= 18 | 91.3212090.47 90.712224.93 91.6812411.85 91.8212556.13 93.0312664.35 92.7112772.57 92.73 12989 92.9313379.24 93.3313421.87 92.313743.24 90.6213907.21 87.7914185.95 85.9314297.44 95.2214346.63 93.61 14399.1 93.7414595.86 num= 5 n Val Sta .066 6489.4 Lengths: Left Ch 1041.28 8 1 Permanent T 199.32 Elev 4379.42 Elev 1079.42 Elev 1081.28 8 1 Elev 1099.32 E | 90.5212280.67 91.712480.71 92.4612575.81 92.2612680.75 92.5813070.98 92.9913392.36 92.9413516.97 92.31 13749.8 90.4413972.79 87.3814222.02 85.6514313.84 98.2714366.31 93.34 14510.6 92.4514608.97 n Val Sta Olf Géloca Alamnel Right 36.82 499 cation= 102.29 ation= 99.64 Elev 91.46 | 90.812152.78 90.6812293.79 93.6212497.11 92.1412628.28 92.6612687.31 92.7912825.04 92.6313103.78 92.7313398.91 92.89 13559.6 92.0313798.99 89.38 14035.1 86.914238.41 88.3 14320.4 99.4314379.42 93.3414523.71 92.2414625.37 | 90.82
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| 12510.22 12647.96 12697.14 12903.74 13208.23 13405.47 13608.79 13854.74 14061.33 14244.97 14430.23 14389.26 14536.67 14635.21 Manning's Sta O Bank Sta: 641 Ineffectiv Sta L 0 6 Left Levee Right Leve Blocked Ob Sta L 0 5 CROSS SECT | 91.5812038.01 90.5112195.41 91.2312375.77 92.212520.06 92.5912657.79 92.6412733.22 92.9 12926.7 92.413415.31 92.6213657.98 91.141345.31 92.6213657.98 91.1413484.25 88.5514136.76 87.214258.09 92.2514340.07 97.114395.82 96.4214576.18 91.98 n Values n Val Sta .09 6469.72 Left Right .3.97 6709.12 re Flow num= Sta R Elev 413.97 88.7 re Station= se Station= se Station= se Station= structions Sta R Elev 3558.01 91.11 | 91.3212090.47 90.712224.93 91.6812411.85 91.8212556.13 93.0312664.35 92.7112772.57 92.73 12989 92.9313379.24 93.3313421.87 92.313743.24 90.6213907.21 87.7914185.95 85.9314297.44 95.2214346.63 93.61 14399.1 93.7414595.86 num= 5 n Val Sta .066 6489.4 Lengths: Left Ch 1041.28 8 1 Permanent T 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 4379.42 Elevalory 42 199.32 Elevalory 4379.42 Elevalory 42 199.32 Elevalory 4379.42 Elevalo | 90.5212280.67 91.712480.71 92.4612575.81 92.2612680.75 92.5812785.69 92.813070.98 92.9913392.36 92.9413516.97 92.31 13749.8 90.4413972.79 97.3814222.02 85.6514313.84 98.2714366.31 93.34 14510.6 92.4514608.97 n Val Sta Olf George State Stat | 90.812152.78 90.6812293.79 93.6212497.11 92.1412628.28 92.6612687.31 92.7912825.04 92.6313103.78 92.7313398.91 92.89 13559.6 92.0313798.99 89.38 14035.1 86.914238.41 88.3 14320.4 99.4314379.42 93.3414523.71 92.2414625.37 | 90.82
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| 12510.22 12647.96 12697.14 12903.74 13208.23 13405.47 13608.79 13854.74 14061.33 14244.97 14430.23 14389.26 14536.67 14635.21 Manning's Sta O Bank Sta: 641 Ineffectiv Sta L 0 6 Left Levee Right Leve Blocked Ob Sta L 0 5 CROSS SECT | 91.5812038.01 90.5112195.41 91.2312375.77 92.212520.06 92.5912657.79 92.6412733.22 92.9 12926.7 92.413415.31 92.6213657.98 91.141345.31 92.6213657.98 91.1413484.25 88.5514136.76 87.214258.09 92.2514340.07 97.114395.82 96.4214576.18 91.98 n Values n Val Sta .09 6469.72 Left Right .3.97 6709.12 re Flow num= Sta R Elev 413.97 88.7 re Station= se Station= se Station= se Station= structions Sta R Elev 3558.01 91.11 | 91.3212090.47 90.712224.93 91.6812411.85 91.8212556.13 93.0312664.35 92.7112772.57 92.73 12989 92.9313379.24 93.3313421.87 92.313743.24 90.6213907.21 87.7914185.95 85.9314297.44 95.2214346.63 93.61 14399.1 93.7414595.86 num= 5 n Val Sta .066 6489.4 Lengths: Left Ch 1041.28 8 1 Permanent T 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 42 199.32 Elevalory 4379.42 Elevalory 42 199.32 Elevalory 4379.42 Elevalory 42 199.32 Elevalory 4379.42 Elevalo | 90.5212280.67 91.712480.71 92.4612575.81 92.2612680.75 92.5812785.69 92.813070.98 92.9913392.36 92.9413516.97 92.31 13749.8 90.4413972.79 97.3814222.02 85.6514313.84 98.2714366.31 93.34 14510.6 92.4514608.97 n Val Sta Olf George State Stat | 90.812152.78 90.6812293.79 93.6212497.11 92.1412628.28 92.6612687.31 92.7912825.04 92.6313103.78 92.7313398.91 92.89 13559.6 92.0313798.99 89.38 14035.1 86.914238.41 88.3 14320.4 99.4314379.42 93.3414523.71 92.2414625.37 | 90.82
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64788.20
7926.09 |

| Vel Total (ft/s) | 0.79 | Avg. Vel. (ft/s) | 0.67 | 2.12 | 0.74 |
|-------------------|------------|------------------------|-----------|----------|--------------|
| Max Chl Dpth (ft) | 43.03 | Hydr. Depth (ft) | 9.99 | 29.47 | 11.08 |
| Conv. Total (cfs) | 14209250.0 | Conv. (cfs) | 4751436.0 | 2093078 | .0 7364732.0 |
| Length Wtd. (ft) | 695.90 | Wetted Per. (ft) | 6211.30 | 306.80 | 7940.92 |
| Min Ch El (ft) | 58.64 | Shear (lb/sq ft) | 0.05 | 0.14 | 0.05 |
| Alpha | 1.76 | Stream Power (lb/ft s) | 0.03 | 0.29 | 0.04 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 75493.48 | 35218.29 | 101890.70 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 12006.29 | 1631.69 | 12991.65 |

Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande

RS: 144.55

INPUT

Description: RGV-01, Updated on left with new survey to Station 1231.74.

Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with 2017 survey Station Elevation Data num= 427 Sta 0 Sta 29.98 Sta 97.52 109.93 103.86 186.89 59.96 92.24 72.95 92.2 93.28 96.77 95.87 129.92 100.53 140.92 225.88 104.3 88.23 146.91 235.87 105.03 162.9 249.87 186.89 267.87 209.88 89.26 88.41 90.84 91.63 91.34 310.86 91.09 340.86 360.86 91.33 391.85 91.66 431.85 91 38 721.8 91.94 752.8 792.8 91.87 829.79 550.83 91.43 92.26 92.06 1073.76 94.58 1308.82 92.77 1114.76 90.88 1351.46 889.78 872.79 92.37 92.61 1231.74 92.97 1407.23 90.8 1436.75 90.65 1446.6 90.37 1482.68 91 1515.48 90.91 91.19 1554.85 90.78 1731.99 90.58 1564.69 91.32 1745.11 90.76 1859.92 90.58 1968.18 90.96 1600.77 91.1 1764.79 91.33 1669.66 91.29 1777.91 1689.34 90.97 91.55 1882.89 91.06 2020.66 1810.72 91 1836.96 91.59 1889.45 1928.81 91.01 1948.49 91.02 2037.06 2050.19 90.82 2063.31 90.96 2086.27 90.62 2109.23 91.3 2138.76 90.5 90.43 2220.77 91 2329.02 90.78 2479.92 91.43 2601.3 90.68 2453.68 90.66 2561.93 90.66 2689.87 2312.62 90.63 2388.07 90.49 2394.63 90.33 2470.08 2578.33 90.61 2499.6 90.93 2627.54 90.95 2529.13 91.12 2643.94 90.7 90.75 2745.63 92.5 2840.77 91.89 2958.86 90.38 2716.11 92.46 2830.92 91.13 2765.32 92.19 2860.45 91.91 92.78 2709.55 91.79 92.31 2876.85 91.38 3037.59 90.75 3342.67 2912 94 92.28 2919 5 91.97 2998.23 91.64 91.18 3142.56 91.99 3188.49 91.94 3280.34 91.63 3447.64 90.85 3572.3 91.28 3726.48 91.6 3811.77 91.15 3936.42 91.04 3418.12 90.7 3565.74 91.22 3716.64 3372.19 90.59 3398.44 91.85 3470.61 91.02 92.17 3746.16 3624.78 90.79 3644.47 91.59 3759.28 3877.38 92.27 3765.84 90.68 3897.06 91.79 3788.81 90.25 3929.86 91.87 3844.57 91.02 3959.39 90 96 91.63 3979 07 91.71 3992.19 91.41 4051.24 91 84 4061 08 91.71 4087.32 92 04 92.63 4116.85 94.33 4228.38 93.3 4159.49 94.39 4231.66 94.36 4274.31 94.73 4251.34 4195.58 94.96 94.21 4349.76 93.6 4425.21 94.42 4362.88 93.09 4441.61 93.71 4369.44 93.89 4395.68 4415.37 90.42 4448.17 89.86 4480.97 89.36 4546.58 4667.96 89.48 4556.42 88.96 4713.88 89.08 4582.67 88.96 4727.01 89.29 4608.91 88.63 4763.09 89.88 4628.59 89.32 4795.89 89.28 88.97 4822.14 89.01 4864.78 88.44 5058.33 4802.46 89.17 4851.66 89.34 4900.87 4959.92 4996 89.21 5038.65 88.3 5107.53 5130.5 88.45 5199.39 88.88 5291.24 5117.38 88.44 88.8 5156.74 88.9 5169.86 88.83 88.25 5248.59 89.63 5373.25 88.78 5268.28 90.01 5389.65 89.88 5409.33 5333.88 89.71 5360.13 90.23 5432.3 5576.64 90.15 5455.26 89.19 5586.48 90.22 5543.83 89.63 5645.52 89.32 5556.95 89.43 5711.13 90.53 5514.31 89.47 89.58 5612.72 89.61 90.87 5809.54 90.49 5967.01 90.36 5871.87 90.94 6019.48 5776.74 90.1 5786.58 90.24 5829.23 90 28 90.03 5944.04 91.01 5980.13 6042.43 92.01 6055.55 92.68 6091.62 92.69 6114.58 93.47 6137.53 93.37 93.86 6167.04 93.18 6176.88 93.72 6203.12 66.56 6284.31 59.86 6304.31 6235.91 73.95 6249.03 68.61 6264.31 61.86 61.86 6334.31 68.05 6409.71 6314.31 63.86 6354.31 64.06 6374.31 65.86 6394.31 68.64 6422.83 76.19 6426.11 77.23 6435.94 6403.15 78.04 6445.78 6531.04 80.3 6462.18 89.24 6540.88 79.76 6478.58 87.74 6550.72 82.09 6494.97 88.52 6570.39 83.54 6511.37 89.04 6613.02 6655.66 88 28 6672 05 88 41 6731 08 88 13 6767 15 88.16 6799.94 88 39 88.84 6849.13 90.46 6908.16 89.76 6858.97 90.72 6927.83 6888.48 89.86 6944.23 90.61 6963.91 90.5 6996.7 7206.57 90.72 7016.37 90.19 7213.13 90.47 7065.56 89.96 7324.62 90.58 7101.64 90.07 7341.02 90.33 7173.78 89.85 7390.21 89.86 89.56 7527.94 88.84 7760.77 89.2 7541.06 89.03 7813.24 89.39 7577.13 88.81 7823.07 7501.71 89.27 7514.82 89 23 89.38 7698.46 7616.48 88.33 7947.69 87.94 8160.84 7846 03 88 71 7868 98 88 47 7882 1 88 63 7931 29 88 46 88.14 8114.93 87.62 8419.9 87.8 8121.49 87.49 8429.74 8229.7 87.82 8282.17 87.23 8455.97 87.72 87.49 88.19 8498.6 8721.6 87.78 8600.26 88.07 8783.9 87.76 8610.1 88.43 8819.98 87.99 8636.33 88.35 8842.93 8478.93 8701.92 88.5 8931.47 88.45 9157.74 89.77 9459.44 89.06 9220.05 89.88 9472.56 89.13 9243 89.35 9482.39 89.29 9285.64 89.79 9502.07 89.25 9361.06 92.56 9525.02 92.76 9643.08 93.37 9547.98 92.04 9675.87 91.5 9584.05 92.16 9725.06 9511.91 92.28 9633.24 92 09 91.86 9869.35 91.71 9938.22 91.7910072.67 90.7810348.13 9764.41 91.69 9971.01 91.5110000.52 91.79 91.7510187.44 90.4310397.32 10016.92 91.5710033.32 91.2510233.35 10289.1 90.9210338.29 90.410443.23 90 10462.9 10787.55 89.67 10495.7 88.5210813.79 89.6310597.35 88.7110872.82 88.9910692.45 88.4310918.73 88.6510715.41 88.4611007.27 88.69 88.3 11053.18 88.4411059.74 8811079.41 88.5111092.53 90.5711102.37 90.97 93.1211135.16 94.6411171.23 93.0811125.32 92.1411148.28 11118.76 11187.63 93.4911200.75 94.0211233.54 94.1711243.38 93.911282.73 94.11 93.4411358.15 92.6911636.89 94.4511377.83 92.4411692.64 92.2311754.95 11459.81 92.6711502.44 92.41 11807.42 11925.47 92.2711817.25 91.77 11984.5 91.9511836.93 91.611991.06 92.0311859.88 91.78 12063.2 91.7411899.24 91.9412112.39 91.7712318.99 92.1112587.89 12164.86 91.8212276.35 91.5712400.97 91.7212473.11 91.63 12705 94 92 2612748 57 92 0112764 97 92 1 12886 3 91 9413046 99 92 09 91.6913276.54 91.34 13440.5 91.43 90.73 91.5813388.04 13342.13 91.3613358.52 91.4213519.21 13558.56 90.2613620.87 89.9413650.38 89.313686.45 87.0813994.71 88.9313889.77 85.7714014.38 13961.91 86.1813971.75 86.2713981.59 14020.94 86.114037.34 89.3614060.29 92.3514066.85 93.9114076.69

```
Manning's n Values num=

Sta n Val Sta n Val

0 .172 5776.74 .066
                                                                      n Val
                                                                                                 .066 6531.04
                                            .066 6235.91
                                                                        .015 6409.71
Bank Sta: Left Right Lengths: Left Channel Right
6144.09 6531.04 855.55 4265.19 3099.28

Left Levee Station= 146.91 Elevation= 105.03

Right Levee Station=14102.92 Elevation= 99.19

Blocked Obstructions num= 2

Sta L Sta R Elev Sta L Sta R Elev
63.1 4175.9 91.4111168.4514197.18 91.41
                                                                                                  Coeff Contr.
                                                                                                                           Expan.
CROSS SECTION OUTPUT Profile #Design Flow
                                        101.64
                                                                                                     Left OB
0.157
855.55
61697.42
61697.42
                                                                                                                       Channel
                                                             Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   E.G. Elev (ft)
                                                                                                                                            Right OB
   Vel Head (ft)
                                                                                                                                            0.067
                                          101.62
   W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                         4265.19
9859.99
                                                             Area (sq ft)
Flow (cfs)
Top Width (ft)
                                          0.000072
   E.G. Slope (ft/ft)
                                                                                                                          9859.99
                                                                                                                                          84232.78
                                                                                                                          22367.43
                                          125000.00
                                                                                                        23568.82
                                                                                                                                            79063.75
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                          13933.28
                                                                                                       5974.45
                                                                                                                           386.95
                                                                                                                                            7571.88
                                                0.80
41.76
                                                              Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                              2.27
                                                                                                            0.38
                                                                                                                                                 0.94
                                                                                                                             25.48
   Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                              Conv. (cfs)
Wetted Per. (ft)
                                          14711690.0
                                                                                                          2773897.0
                                                                                                                             2632501.0
                                                                                                                                                 9305289.0
                                                              Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                             59.86
                                                                                                            0.05
                                                                                                                            0.11
                                                                                                                                                 0.05
                                                 2.34
                                                                                                            0.02
                                                                                                                               0.25
   Frctn Loss (ft)
                                                                                                      74003.41
                                                                                                                        35040.04
                                                                                                                                          100905.00
   C & E Loss (ft)
                                                 0.00
                                                              Cum SA (acres)
                                                                                                      11860.67
                                                                                                                         1625.14
                                                                                                                                          12902 88
Warning: The cross-section end points had to be extended vertically for the computed water surface
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                          RS: 144
REACH: Lower Reach
Description: RGV-01, new cross-section, Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with
                     2017 survey
Station Elevation Data
     Sta Elev Sta
0 91.9 34.6
108.43 90.1 269.79
1515.2 91 637.91
106.27 92.9 819.39
17.77 92.19 937.45
                                             Elev
                                                            Sta
                                                      Sta
69.2
331.14
                                                                                                97.69 147.08
89.85 453.85
91.53 773.47
                                           91.98
88.45
                                                                     94.65 108.14
89 392.49
                                                                                                                           98.18
90.76
   208.43
                                                                       91.23 760.61
     515 2
                                                91 699.26
                                                                                                                           92 06
                                                                      92.08 1052.23
                                            92.53 1035.84
                                                                                                 92.61 1071.91
   917.77
                                                                                                                           92.36
                  93.79 1180.14
                                            94.01 1212.93
                                                                       93.55 1262.13
                                                                                                 94.13 1294.92
  1337.56
                  94.04 1357.24
                                            93.01 1380.19
                                                                       92.85 1419.55
                                                                                                 94.33 1458.9
                                                                                                                           95.25
                                            95.44 1534.33
92.49 1681.92
92.42 1816.38
  1472.02
                  94.94 1494.98
93.54 1645.84
                                                                      93.38 1550.73
92.39 1691.75
                                                                                                 93.02 1580.25
93.07 1708.15
  1613.04
  1744 23
                  93 01 1777 02
                                                                       92.58 1855.73
                                                                                                 93.29 1881.97
                                                                                                                           90 88
                                            90.15 2518.2
90.69 2675.61
                                                                       90.15 2560.83
  1911.49
                  90.64 2652.66
91.16 2803.51
90.83 2954.37
  2616.58
                                                                       91.58 2695.29
                                                                                                 91.03 2744.48
                                                                                                                           90.67
                                            91.1 2833.03
91.47 2997
                                                                                                 91.48 2905.18
90.51 3095.39
                                                                       90.63 2865.83
  2941.25
                                                                       90.49
                                                                                 3046.2
                                                                                                                           91.43
                                            90.67 3236.41
90.51 3364.31
90.59 3557.8
                                                                      90.99 3272.48
90.88 3423.34
                                                                                                 90.62 3292.16
90.6 3443.02
  3115.07
                  90.93 3154.42
                  90.61 3344.63
91.07 3515.17
90.56 3692.26
                                                                                                                           90.99
  3308.56
                                            90.59 3557.8
90.32 3767.69
                                                                                 3574.2
3780.8
                                                                                                 90.75 3616.83
91.11 3803.76
  3495.49
                                                                       91.32
                                                                                                                           91.27
                                                                       90.48
                                            91.37 3898.87
91.07 4079.24
94.5 4308.82
  3826.72
                  90.56 3872.63
                                                                       90.41 3948.06
                                                                                                 91.06 3997.25
                                                                                                                           91.31
  4049.72
4171.07
                                                                      95.11 4105.48
95.17 4387.53
                                                                                                 95.94 4151.39
94.9 4397.37
                  90.56 4056.28
                  96.51 4210.43
                                                                                                                           95.13
                                            94.5 4308.82
94.44 4476.08
94.11 4590.87
94.39 4699.1
92.6 4823.73
  4443.28
                  94.07 4449.84
                                                                       93.93 4499.04
                                                                                                 94.15 4538.4
                  93.15 4558.07
                                                                                                 95.06 4626.95
                                                                       94.08 4617.11
  4548.23
                                                                                                                           94.28
                  94.6 4685.98
92.9 4813.89
95.82 4902.44
                                                                       93.78 4738.46
93.27 4846.69
                                                                                                 94.81 4777.81
92.99 4879.48
  4653.18
                                                                                                                             94 3
```

4889 32

5102.5

5197.61

5423.91 5643.65

5922 43

6263.52

6686.6 6873.54

7270.38

7463.88

7529.48 7624.59

7745.94 7827.93

7936.16

8231.33

8674.05 8805.24 8985.63

9106.99

9474 33

9789.2

9910.55

10002.39

10100.79

97.69

5118.9

90.28 5230.41 91.56 5443.59

92.07 5653.49 91.08 5804.36

92.63 5942.1

92.16 6283.19

94.63 6486.53 90.4 6709.55

91.69 6899.78 91.79 7086.72

92 57 7290 06

95.21 7473.72

94.88 7542.6 93.19 7640.99

92.67 7759.06 92.52 7841.05 94.26 7955.84

90.49 8073.91

89.71 8287.08

89.28 8451.04 87.84 8690.45

88.31 8851.16 88.9 8998.75

88.07 9136.51

88.66 9497.29 90.17 9680.97

89.58 9851.52

92.76 9920.39

90.0110123.75

93.410038.47

94.44 4915.56

95.03 5027.07 96.02 5135.3

96.02 5135.3 89.22 5253.37 92.04 5476.39

92.56 5676.45 91.09 5866.67

93.28 5958.5 92.32 6106.09 91.91 6355.35

93.68 6519.33 91.16 6755.47

91.23 6912.9 91.21 7165.43

92.59 7303.18 93.55 7385.17

93.7 7490.12 93.53 7555.72 92.35 7677.06

93.82 7778.73 92.66 7860.73

90.12 7968.96

89.65 8313.31

90.96 8460.88 87.55 8742.92

89.26 8903.64 88.26 9038.11

88.63 9175.87 88.37 9366.1

89 18 9536 65

90.15 9710.48 91.56 9864.64

92.37 9933.51 87.8610064.71

86.4210136.87 90.7510258.22

8106.7

88.76

95 97

4958 2

96.01 5046.75 95.52 5154.98

89.58 5276.33 91.88 5525.58

92.06 5715.81 93.1 5892.91

92.43 5988.02

92.43 5988.02 92.12 6145.45 92.72 6391.42 92.6 6601.32 91.19 6778.43

92.15 6939.13 92.61 7224.47

94.97 7313.02 92.55 7408.13 95.17 7499.96 94.38 7575.39 91.85 7690.18

94.28 7798.41 95.65 7893.52

88.8 7985.36 88.57 8165.74

90.49 8359.22

90.94 8490.39 87.4 8756.04

88.8 8923.32 88.64 9054.51

88.65 9215.22 88.97 9408.74

88 51 9589 13

88.56 9733.44 92.83 9881.04

93.55 9949.91

88.6110074.55

84.9310146.71

95.33 4971.32

95.64 5072.99 96.22 5171.38

90.65 5309.12 92.43 5571.5

92.88 5765 92.18 5909.31

91.96 6010.98 93.09 6194.64

93.6 6453.74

91.18 6630.84 91.92 6830.9 91.37 6991.61 92.17 7250.7

95.44 7326.14 93.24 7417.97

93.52 7519.64

94.1 7608.19 93.06 7706.58

92.94 7811.53 95.21 7919.76

88.56 8027.99

90.28 8382.18

87.04 8526.46 87.82 8782.28

88.05 8943 88.21 9077.47

88.17 9228.34

88.4 9648.17 89.33 9749.84

93.14 9897.44

93.95 9985.99

90.5310090.95

85.1210166.39

95 93

92.09

91.76

92.85

94.08

91.66

91.22

93 37

93.43

92.35

90.76

90.73

88 56

94.95

90.89

92 2

86.0110382.86

```
10402.54
10481.25
             86.6710409.09
                                 87.2510428.77
                                                     86.1710441.89
                                                                         88.4510464.85
                                                                                             86.77
10556.69
              88.8510576.37
                                 88.2110592.77
                                                     83.2610605.89
                                                                         82.1410632.13
                                                                                             84.98
10638.69
              84.1810648.52
                                  80.7210655.08
                                                     79.7610671.48
                                                                         79.6410694.44
10710.84
               77.7 10733.8
                                  73.7210753.48
                                                     74.84 10766.6
                                                                         76.8710776.44
                                                                                             76.53
                                                                         78.7110822.36
62.9310915.66
10792.84
             74.08 10799.4
                                  74.5110809.24
                                                     78.52 10815.8
 10832.2
                                                     66.3110905.08
             69.1610842.04
                                 67.09 10849.4
10950.27
               67.110963.39
                                 69.8310983.07
                                                     76.2310992.91
                                                                         88.5510996.19
                                     9111097.87
                                 90.4611327.46
             89.9211317.62
89.5411576.66
11281.54
                                                     89.6911370.09
                                                                         90.0611422.57
                                                                                             89.53
                                                     89.9211632.39
89.3711894.66
                                                                         89.7611652.06
89.5711956.95
11694.68
              89.5611760.25
                                 89.57 11842.2
             89.4412065.13
93.8412209.38
12002 84
                                 89.2612097.91
                                                     89.6612127.42
                                                                         89.5812176.59
                                                                                             90 42
12189.71
                                 92.3312229.05
                                                     93.2512337.23
                                                                         93.3412386.41
                                                                                             93.53
12442.14
             92.2812448.69
                                 93.5112455.25
92.1112786.36
                                                     92.1612465.08
                                                                         92.4912510.98
92.212887.99
                                                     91.9612835.54
                                                                                             91.93
             91.9412999.45
92.2613261.72
12973.22
                                   92.213045.35
                                                     92.0713133.86
                                                                         92.4313176.48
13209.26
                                 92.0813425.63
13596.11
              92.0413684.62
                                 92.0913740.35
                                                     92.3713782.97
                                                                         92.1113937.05
                                                                                             92.19
             91.8813976.39
98.2414051.79
                                 92.5613992.78
97.5714068.18
                                                     93.6414002.62
93.1914084.58
13950.16
                                                                         93.2514019.01
14025.57
                                                                         91.9714100.97
                                                                                             94.04
14110.8
14235.38
             93.2414146.86
85.8614287.83
                                 92.2714182.92
85.6614343.56
                                                                         90.8714212.43
85.714422.24
                                                     92.0714196.04
                                                     85.9214356.68
                                                                                              86.3
                                 87.1514471.42
98.9414546.82
14448.47
             86.28 14458.3
                                                     91.8214487.81
                                                                         94.3314500.92
14668.12 93.7814677.95
                                 97.8414707.46
                                                     96.95
Manning's n Values num=
                                              Sta
                                                    n Val
                                                                        n Val
                                                                                     Sta
                                                                                            n Val
              .172 10766.6
        0
                                 .06610842.04
                                                      .01510950.27
                                                                          .06611694.68
                                                                                              .067
                     Expan.
       10537.0110992.91
                                                                           .1
Ineffective Flow
             Sta R
   Sta L
        010537.01
Left Levee Station= 147.08
Right Levee Station=14025.57
                                              Elevation= 98.18
Elevation= 98.24
Blocked Obstructions num=
Sta L Sta R Elev
1494.98 4171.07 93.81
                                            1
CROSS SECTION OUTPUT Profile #Design Flow
                             101.34
  E.G. Elev (ft)
                                               Element
                                                                               Left OB
                                                                                            Channel
                                                                                                         Right OB
  Vel Head (ft)
                                               Wt. n-Val.
                                               Reach Len. (ft)
Flow Area (sq ft)
  W.S. Elev (ft)
Crit W.S. (ft)
                               101.32
                                                                              1039.03
                                                                                            1363.41
                                                                                                          2237.29
  E.G. Slope (ft/ft) 0.000208
Q Total (cfs) 125000.00
Top Width (ft) 14707.46
                                              Area (sq ft)
                                                                                                        37072.08
                                                                             96498.28
                                                                                          11805.85
                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
                                125000.00
                                                                              51380.24
                                                                                            18452.89
                                                                                                          55166 87
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                             10537.01
                                                                                             455.90
                                                                                                          3714.55
                                     0.87
                                                                                  0.54
                                                                                               1 56
                                                                                                             1 49
  Conv. Total (cfs)
Length Wtd. (ft)
                                8666470.0
                                                                              3562283.0 1279371.0
                                                                                                            3824816.0
                                               Wetted Per. (ft)
                                1575.76
                                                                                            472.25
                                               Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                              0.12
                                                                                             0.32
  Min Ch El (ft)
                                   57.62
                                                                                                             0.13
                                     1.94
                                                                                  0.06
                                                                                                0.51
  Frctn Loss (ft)
                                                                             72449.88
                                                                                          33979.33
  C & E Loss (ft)
                                     0 00
                                              Cum SA (acres)
                                                                             11698 52
                                                                                            1583.87
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
```

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

Station Elevation Data

RS: 143.5

89.1510333.66

Description: RGV-01, new cross-section, Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with 2017 survey

| Station E. | | | muni- | 440 | | | | | |
|------------|-------|---------|-------|---------|-------|---------|-------|---------|-------|
| Sta | Elev | | Elev | Sta | Elev | | Elev | | Elev |
| 0 | 91.59 | 34.56 | 92.16 | 69.12 | 92.85 | 104.63 | 96.23 | 140.15 | 98.25 |
| 200.91 | 94.17 | 261.67 | 86.97 | 322.44 | 88.59 | 383.2 | 89.31 | 443.96 | 90.25 |
| 504.72 | 90.75 | 565.49 | 90.95 | 626.25 | 90 | 687.01 | 89.98 | 747.77 | 89.55 |
| 763.48 | 90.81 | 806.12 | 90.34 | 848.77 | 91.34 | 868.46 | 90.29 | 888.14 | 91.77 |
| 897.98 | 93.7 | 907.82 | 92.41 | 920.95 | 92.38 | 940.63 | 93.17 | 950.47 | 92.69 |
| 973.44 | 92.54 | 1002.96 | 93.69 | 1012.81 | 93.08 | 1032.49 | 93.32 | 1039.05 | 92.92 |
| 1058.73 | 93.26 | 1088.26 | 92.83 | 1107.94 | 93.18 | 1160.43 | 93.16 | 1189.96 | 93.6 |
| 1222.77 | 93.66 | 1291.66 | 93.12 | 1304.78 | 93.75 | 1331.03 | 93.94 | 1344.15 | 93.6 |
| 1360.55 | 94.05 | 1380.24 | 93.55 | 1409.76 | 94.13 | 1416.32 | 93.8 | 1442.57 | 94.62 |
| 1472.09 | 93.88 | 1481.94 | 94.4 | 1514.74 | 94.64 | 1537.71 | 94.39 | 1550.83 | 95.21 |
| 1563.95 | 94.3 | 1583.64 | 94.97 | 1593.48 | 94.5 | 1629.56 | 94.86 | 1642.69 | 95.56 |
| 1668.93 | 95.03 | 1708.3 | 92.76 | 1724.7 | 93.33 | 1741.11 | 92.29 | 1773.91 | 92.91 |
| 1813.28 | 91.18 | 1829.68 | 92.33 | 1849.37 | 91.43 | 1865.77 | 91.85 | 1878.89 | 91.33 |
| 1901.86 | 91.47 | 1934.66 | 91.01 | 1941.22 | 90.59 | 1977.31 | 90.42 | 2000.28 | 91.39 |
| 2010.12 | 90.87 | 2036.36 | 92.08 | 2059.33 | 91.83 | 2082.29 | 92.53 | 2092.13 | 92.08 |
| 2141.34 | 92.1 | 2164.31 | 92.43 | 2180.71 | 91.1 | 2206.96 | 90.15 | 3686.54 | 90.15 |
| 3709.5 | 90.77 | 3725.9 | 93.44 | 3739.03 | 93.4 | 3752.15 | 94.76 | 3778.39 | 96.61 |
| 3788.24 | 95.65 | 3794.8 | 96.28 | 3814.48 | 95.34 | 3824.32 | 95.86 | 3850.57 | 93.59 |
| 3870.25 | 93.2 | 3880.1 | 93.54 | 3926.02 | 93.26 | 3965.39 | 93.6 | 4004.76 | 92.67 |
| 4044.13 | 92.78 | 4073.66 | 92.49 | 4103.18 | 93.32 | 4122.87 | 93.02 | 4152.39 | 93.43 |
| 4165.52 | 93.95 | 4198.32 | 94.46 | 4231.13 | 95.4 | 4257.38 | 94.74 | 4273.78 | 95.21 |
| 4286.9 | 96.25 | 4300.03 | 94.89 | 4309.87 | 95.13 | 4319.71 | 93.82 | 4349.24 | 94.01 |
| 4365.64 | 93.55 | 4375.48 | 93.96 | 4385.33 | 93.22 | 4418.13 | 92.23 | 4467.35 | 92.16 |
| 4483.75 | 91.83 | 4536.24 | 92.39 | 4542.8 | 92.02 | 4578.89 | 92.53 | 4595.3 | 92.28 |
| 4631.38 | 92.79 | 4660.91 | 92.44 | 4677.31 | 92.85 | 4693.72 | 92.44 | 4706.84 | 92.93 |
| 4779.02 | 92.79 | 4792.14 | 93.2 | 4808.54 | 92.82 | 4834.79 | 93.59 | 4854.48 | 93.43 |
| 4893.84 | 93.74 | 4933.21 | 93.71 | 5028.36 | 92.9 | 5077.57 | 93.86 | 5090.69 | 93.42 |
| 5110.38 | 93.71 | 5189.11 | 92.63 | 5215.36 | 93.12 | 5238.32 | 92.28 | 5254.73 | 92.38 |
| 5277.69 | 91.88 | 5294.1 | 92.36 | 5313.78 | 91.96 | 5333.47 | 92.32 | 5349.87 | 92.08 |
| 5379.4 | 92.59 | 5422.05 | 92.48 | 5454.85 | 92.13 | 5530.31 | 93.09 | 5576.24 | 92.32 |
| 5592.65 | 92.71 | 5618.89 | 92.26 | 5628.74 | 92.81 | 5668.1 | 92.49 | 5720.6 | 92.68 |
| 5786.21 | 93.96 | 5815.74 | 93.56 | 5828.86 | 94.06 | 5861.67 | 94.31 | 5894.48 | 95.72 |
| 5910.88 | 93.21 | 5924 | 95.21 | 5950.25 | 95.3 | 5976.5 | 94.89 | 5996.18 | 93.61 |
| 6009.3 | 94 | 6032.27 | 93.22 | 6055.23 | 91.81 | 6065.08 | 90.46 | 6078.2 | 87.61 |
| | | | | | | | | | |

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87.42 6179.9
90.34 6330.82
88.98 6507.98
                89.79 6104.45
                                                                 87.83 6156.94
 6212.71
6360.35
                88.38 6245.52
                                        89.4 6261.92
89.47 6406.28
                                                                89.48 6301.29
89.76 6458.77
                                                                                                                 89.81
89.52
                89.43 6586.72
 6553.91
                                         90.19 6629.37
                                                                 90.68 6672.02
                                                                                         90.86 6698.26
                                                                                                                 89.13
                                        87.21 6793.41
90.77 7026.34
                                                                87.78 6859.02
90.68 7049.31
 6737.63
                87.29 6767.16
                                                                                         89.63 6881.99
                90.36 6964.01
 6914.79
                                                                                         90.89 7062.43
                                                                                                                 90.53
                90.84 7101.8
89.28 7259.27
                                                                90.84 7144.45
88.79 7292.08
                                                                                         90.56 7190.38
88.98 7328.17
                                         89.24 7275.68
 7236.31
                                                                88.21 7485.65
89.5 7600.47
91.49 7734.98
                                                                                         88.45 7511.89
90.26 7620.16
92.8 7744.83
  7357.7
                88.58 7367.54
                                        88.36
                                                      7443
                                        88.36 7443
89.78 7574.23
90.55 7725.14
91.62 7797.32
92.49 7895.74
                89.19 7564.38
90.64 7698.9
 7652.97
                                                                                                                 92.84
                94.16 7780.92
95.42 7879.34
92.17 7977.76
                                                                91.97 7836.69
92.97 7908.86
                                                                                         91.71 7843.25
94.62 7921.99
 7859.65
                                                                                                                 93.55
                                        93.18 8000.73
93.75 8095.87
                                                                                         92.94 8043.38
93.45 8161.48
 7958.08
                                                                 92.42 8010.57
                                                                                                                 92 29
                93.66 8076.18
                                                                 92.92 8108.99
 8063.06
                                                                                                                 94.19
 8200.85
                93.52 8233.66
93.83 8332.08
                                          93.9 8246.78
                                                                 94.52
                                                                           8259.9
                                                                                         94.18 8305.83
87.97 8384.56
                                        88.56 8433.77
89.95 8571.55
91.6 8709.32
                                                                                         89.38 8489.54
89.86 8601.07
89.5 8735.56
 8394.41
                89.05 8410.81
                                                                 88.73 8460.02
                                                                                                                 90.67
                90.67 8528.9
90.14 8689.64
                                                                 89.25 8584.67
                                                                91.63 8722.44
88.86 8827.41
90.94 8988.14
 8660.11
                                                                                                                 89.15
                                        89.14 8811.01
91.43 8968.46
90.79 9070.15
84.14 9221.04
                90.08 8771.64
89.47 8945.5
                                                                                         90.06 8866.77
91.52 8997.98
 8758.52
 8876.61
                91.35 9053.75
86.48 9191.52
 9020.94
9158.71
                                                                91.11 9102.95
82.74 9263.68
                                                                                         90.63 9132.47
82.63 9299.77
                                        83.72 9362.09
85.1 9512.98
86.61 9752.44
87.37 9955.82
87.7910106.71
                84.55 9326.01
84.82 9506.42
85.86 9713.08
                                                                83.68 9378.49
85.43 9542.51
87.17 9850.85
                                                                                         84.37 9427.7
85.07 9581.87
87.83 9873.81
 9312.89
                                                                                                                 84.42
 9683.56
                                                                                                                 88.21
9883.66
10057.51
                87.66 9919.74
87.710073.91
                                                                 88.83
                                                                           9975.5
                                                                                         88.19 9995.18
89.1810136.21
                                                                 89.1510116.54
10146 04
                89.0810172.27
                                        88.6910198.49
                                                                86.9410208.32
                                                                                         85.6210221.43
                83.5910264.05
                                        83.2810277.16
                                                                                         85.5410303.38
10234.55
                                                                 83.8810286.99
                                                                                                                 86.91
                                        82.8310339.44
78.9410401.72
                                                                84.7910345.99
80.6510418.11
10309.94
                86.0310323.05
                                                                                         84.7510359.11
                                                                                                                 81.23
                                                                74.9610490.22
67.3510542.67
49.5710609.93
                                                                                        76.6210506.61
66.710555.62
50.8910638.43
                                        73.2510480.39
                                                                                                                  72.28
10450.89
                73.8310460.72
10526.28
                73.7710532.84
53.9910584.69
                                        72.210539.39
53.63 10599.7
                                                                                                                 51.59
                                                                                        70.2410700.01
90.6110785.24
10660 15
                52.5910670.38
                                        52.6110673.79
                                                                  66.710683.62
 10716.4
                  75.410732.79
                                          80.110749.18
                                                                 88.5410759.01
                90.5310847.52
91.4911037.64
10804.91
                                        90.5110899.97
                                                                89.9610932.75
                                                                                             9010991.75
                                                                                                                   90.4
                                                                 89.6711093.37
                                        89.6111231.04
90.6711417.88
                                                                                        89.9611286.77
90.0711493.27
11155.65
                89.6611204.82
                                                                 90.1411240.88
                                                                                                                   90.4
                                                                90.3511444.11
90.0211683.37
 11296.6
                90.1511332.66
11532.61
                                        90.3111653.87
                                                                                         90.5411706.31
                90.13 11591.6
                                                                                                                 90.13
                                        90.3411807.91
91.3611912.78
89.9212043.88
89.7112253.63
                90.5611752.19
92.1911899.67
                                                                91.811840.68
91.6611922.62
11742.36
                                                                                         92.0311860.35
                                                                                                                 91 79
11873.46
                                                                                         90.6311942.28
                                                                                         89.7812115.98
89.7212374.89
11955.39
                90.0112020.94
                                                                89.3112050.43
                                                                                                                 89.78
12145.47
                89.9912197.91
                                                                 89.8812355.22
                89.72 12460.1
9012791.11
12410.94
                                        89.9412502.71
                                                                 89.8212581.36
                                                                                         89.8812666.57
                                                                                                                 89.79
12709.18
13040.19
                  90.113102.46
                                                                                                                 90.46
                                          90.413109.01
                                                                90.2513194.22
                                                                                         90.4613289.27
               90.6513397.42
90.6813590.78
91.2214079.11
93.2814256.08
                                        90.6213426.92
90.9 13617
91.414174.15
                                                                90.813479.35
90.8113721.88
91.4514203.65
                                                                                        90.6113535.07
90.8513980.79
13344.98
13548.18
                                                                                                                 91.29
    14066
                                                                                          92 114206 92
                                                                                                                   91 2
                                        98.7214321.63
                                                                94.9814328.19
14308.52
               99.3414315.08
                                                                                         93.2414436.34
Manning's n Values
      Sta n Val Sta n Val Sta 0 .07 140.15 .1210542.67
                                                       Sta
                                                                n Val
                                                                                        n Val
                                                                                                                 n Val
                                                                  .02510673.79
                                                                                           .0710899.97
Lengths: Left Channel Right 10146.0410749.18 1673.73 2335.33 3367.52

Ineffective Flow num= 1

Sta L Sta R Flow 7
                                                                                           Coeff Contr.
    Sta L
Sta L Sta R Elev Permane
010116.54 89.18 T
Left Levee Station= 140.15
Right Levee Station=14275.75
                                                        Elevation= 98.25
Elevation= 99.38
Blocked Obstructions num=
Sta L Sta R Elev
1642.69 3778.39 93.4
                                                    1
CROSS SECTION OUTPUT Profile #Design Flow
                                     101.09
  EG Elev (ft)
                                                        Element
                                                                                               Left OB
                                                                                                                Channel
                                                                                                                                Right OR
                             0.02
101.07
83.88
) 0.000122
125000.00
                                                                                                                                 0.066
                                                        Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                                                2335.33
  W.S. Elev (ft)
                                                                                               1673.73
  Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                                             92815.91
96694.95
                                                                                                              15995.74
15995.74
                                                                                                                               38478.16
38478.16
                                                        Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                               23660.12
  Q Total (cfs)
                                      125000.00
                                                                                               55925.49
                                                                                                                                45414 38
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                                                             10146.04
                                                                                                                                 3723.21
                                      14472.39
                                                                                                                 603.14
                                            0.85
                                                                                                   0 60
                                                                                                                    1 48
                                                                                                                                     1 18
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                      11299770.0
                                                         Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                                 5055564.0
                                                                                                                  2138832.0
                                                                                                                                     4105378.0
                                                                                                                626.48
                                        2563.00
                                                                                             10162.53
                                                                                                                                 3730.14
                                                                                              0.07
                                           49.57
                                                                                                                                     0.08
  Alpha
Frctn Loss (ft)
                                             1.50
                                                         Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                             0.04
70145.77
                                                                                                                    0.29
  C & E Loss (ft)
                                            0 00
                                                        Cum SA (acres)
                                                                                             11451.85
                                                                                                               1567.30
                                                                                                                              12310 36
Warning: The cross-section end points had to be extended vertically for the computed water surface. Note: Manning's n values were composited to a single value in the main channel.
             Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                      RS: 143.25
REACH: Lower Reach
Description: RGV-01, Updated on left with new survey to Station 1138.37.

Bathymetric elevations translated from IBWC 2008 Cross-sections,
                   Section along left levee updated with 2017 survey
Station Elevation Data
                                      num=
                              Sta
                                                       Sta
                                                                  Elev
      Sta
                 Elev
                                         Elev
                            13.92
62.67
          Λ
                91.17
95.62
                                        91.88
96.78
                                                    27.85
89.52
                                                                97.41
99.79
                                                                         37.8 97.76
101.46 104.36
                                                                                                  44.76 95.62
119.43 104.09
    58.69
  166.42
                                        86.9 206.42
83.74 464.41
                                                  206.42
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88.02

190.42

90.72 278.42

89.24

306.42

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85.82
                   88.31 927.38
91.43 1157.17
                                                                              88.86 1064.37
92.02 1222.78
93.28 1327.76
  905.38
1140.77
                                                88.75 1024.38
92.35 1206.38
                                                                                                           89.58 1138.37
                                                                                                                                         89.9
  1255.59
                    92.55 1265.43
                                                 93.13 1304.79
                                                                                                           93.68 1344.16
                                                                                                                                        93.42
                                                                              93.32 1406.49
93.77 1521.3
  1363.84
                    90.86 1376.96
                                                 92.69 1396.65
                                                                                                           93.04 1419.61
  1449.13
                    93.36 1475.38
                                                 93.36
                                                           1488.5
                                                                                                           92.72 1580.35
                                                                                                                                        92.68
                    92.27 1626.28
91.85 1767.34
                                                 92.86 1652.52
91.06 1806.7
                                                                              92.05 1665.64
91.99 1819.82
                                                                                                           92.16 1701.73
91.42 1859.19
                                                91.06 1806.7
92.63 1964.16
  1708.29
  1882.15
                    92.69 1928.08
                                                                              93.08 1980.56
                                                                                                           92.34 1996.97
89.72 2180.67
                                                89.8 2052.73
91.14 2239.72
92.5 2347.97
93.76 2521.83
                   90.64 2216.75
91.79 2315.17
93.02 2498.87
                                                                                                                                        91.91
  2210.19
                                                                              90.79
                                                                                        2259.4
                                                                                                           91.15 2272.52
                                                                                                          92.56 2416.86
93.91 2561.2
92.87 2676.02
93.75 2810.51
                                                                             92.77 2390.62
93.47 2528.4
   2443.1
                                                                              93.47 2528.4
93.1 2656.33
93.66 2794.11
                                                                                                                                        93.53
                                                94.09 2626.81
92.53 2728.5
93.44 2895.8
92.39 3040.14
 2584.16
2702.26
                   94.21 2610.41
92.12 2715.38
                                                                                                                                         92 1
                                                                                                                                        94.23
                                                                             93.29 2928.61
91.98 3066.39
92.24 3177.92
95.14 3279.61
 2840.04
3007.34
                   94.42 2869.56
91.95 3027.02
                                                                                                          93.86 2964.69
91.97 3076.23
                                                                                                                                        93.32
                                                 92.5 3135.28
93.98 3269.77
95.09 3371.47
                                                                                                          93.4 3223.85
94.19 3302.58
94.68 3410.83
                   91.96 3125.43
93.76 3250.09
  3099.19
                                                                                                                                        93.07
                                                                             94.28 3400.99
95.7 3479.72
96.43 3633.9
  3318.98
                    93.81 3358.35
                                                                                                                                        95.76
                                                95.19 3473.16
96.5 3578.13
96.4 3683.11
93.98 3794.64
  3420.67
3515.81
                   95.15 3460.04
95.65 3535.49
                                                                                                          95.2 3489.56
96.12 3647.02
                                                                                                                                        95.92
97.66
                                                                                                          96.12 3047.02
96.1 3732.31
90.65 3893.06
91.74 4060.36
92.75 4158.77
                                                                              97.16 3712.63
92.57 3863.53
  3660.15
3742.16
                   97.53 3669.99
96.4 3778.24
                                                                                                                                        95.93
                                                91.4 3981.63
92.59 4119.41
92.57 4207.98
92.91 4365.45
94.27 4490.11
                   91.65 3935.7
91.73 4096.44
  3912.74
                                                                               92.1 4027.55
                                                                                                                                        92.21
                                                                              92.24 4135.81
                   93.4 4185.02
93.55 4349.05
93.52 4467.15
93.89 4624.62
                                                                              93.24 4217.82
93.49 4381.85
94.06 4562.29
                                                                                                           93.04 4309.68
93.11 4411.38
94.37 4581.97
  4168.62
                                                                                                                                        94.16
  4316.24
  4598.37
                                                 94.57 4637.74
                                                                              94.08 4647.58
                                                                                                           94.58 4693.51
                                                                                                                                        94 08
  4719.75
                                                 94.71 4755.84
                                                                              94.48 4775.52
                                                                                                           95.04 4795.21
                    95.24 4732.88
                                                                                                                                        94.65
                                                                                                           95.49 4929.71
94.46 5034.69
                                                 95.37 4890.35
95.06 4995.32
                                                                             94.83 4906.75
94.3 5018.29
  4801.77
                     95.2 4864.1
                                                                                                                                        94.79
                    95.28 4978.92
                                                                                                          91.74 5106.86
90.79 5215.12
90.03 5366.03
                    94.17 5060.94
                                                 93.91 5077.34
                                                                              92.19 5093.74
  5044.53
                                                                                                                                        90.82
  5142.95
5244.65
                   90.36 5159.35
90.67 5257.77
91.7 5425.08
92.71 5536.62
                                                 90.54 5182.32
90.18 5290.58
                                                                              91.57 5198.72
89.91 5333.23
                                                                                                                                        90.73
                                                                                                           91.9 5477.57
92.68 5585.83
                                                91.52 5441.48
92.19 5546.46
                                                                              92.14 5461.17
92.91 5559.59
  5385.71
                                                                                                                                        92 46
  5503.82
                                                  94.1 5621.92
  5595.67
                    94.58 5602.23
                                                                              88.34 5635.04
                                                                                                           87.65 5648.16
                                                                                                                                        88.48
                   87.32 5808.91
87.18 5930.29
91.19 6018.87
                                                88.18 5831.88
87.7 5943.42
90.66 6028.71
                                                                             88.22 5851.56
88.49 5956.54
91.19 6068.08
                                                                                                           87.26 5887.65
89.98 5979.5
89.36 6091.04
  5772.82
                                                                                                                                        90.19
  5904.05
  6009.03
                                                                                                                                        87.37
                   88.43 6114.01
89.25 6215.7
88.89 6291.16
 6104.16
6192.74
                                                 88.18 6150.09
88.68 6228.83
                                                                             88.24 6163.22
89.2 6241.95
                                                                                                           89.23 6179.62
88.44 6274.76
                                                                                                                                        88 43
                                                 87.87 6314.12
                                                                             89.04 6327.24
87.52 6419.1
                                                                                                          87.89 6353.49
88.2 6455.19
   6284.6
                                                                                                                                        87.56
                    87.88 6383.01
                                                 87.53 6409.26
                                                                                                          88.86 6599.53
87.74 6674.99
87.15 6825.89
87.46 7026.01
88.19 7288.46
                                                88.13 6514.24
88.2 6638.9
88.06 6763.56
                                                                              88.06 6547.04
  6468.31
                    88.56 6478.15
                                                                                                                                        88.72
                   87.94 6629.06
87.53 6737.32
                                                                              87.67 6665.15
87.34 6806.21
  6694.67
                                                                                                                                        88.03
                   88.46 6911.19
88.61 7104.75
89.11 7317.98
                                                 87.9 6927.59
88.87 7163.8
88.88 7367.19
  6878.38
7081.78
                                                                              87.98 6950.56
88.65 7213
                                                                                                                                        88.62
                                                                             88.65 7213
88.91 7409.84
93.67 7570.59
93.17 7629.64
                                                                                                          89.6 7442.65
93.06 7580.43
92.09 7649.32
  7304 86
                                                                                                                                        92 62
                   93.24 7495.14
93.37 7603.4
                                                92.79 7531.22
94.39 7613.24
  7590.27
                                                                                                          92.09 7649.32
92.66 7773.99
92.91 7918.11
92.49 8003.26
92.22 8101.5
90.96 8196.46
92.81 8320.9
94.43 8419.14
                                                                                                                                        92.14
                                                90.47 7714.94
91.75 7859.17
                                                                              92.36 7754.3
93.27 7872.27
  7793.67
                    91.88
                                7829.7
                                                                                                                                        93.59
                    92.89 7950.86
92.67 8036
                                                93.32 7973.78
93.03 8052.38
                                                                              93.24 7993.43
92.21 8072.03
                                                                                                                                         92.7
  8114.6
8216.11
                   93.42 8140.79
93.49 8255.41
                                                 93.62 8166.99
                                                                              93.35 8186.64
                                                                                                                                        92 94
                                                93.35 8281.61
94.38 8373.29
                                                                               92.3 8311.08
  8340.55
                     94.8 8363.47
                                                                              95.03 8389.67
                                                                                                                                        94.25
                                                                                                          84.38 8487.91
62.7 8547.65
                   94.87 8458.44
72.47 8514.1
                                                94.83 8468.26
67.35 8520.65
                                                                              91.06 8478.08
62.3 8533.65
                                                                                                                                         59.3
  8494.46
 8558.65
8651.62
                    60.8 8579.65
68.79 8661.43
                                                61 8612.65
73.37 8677.77
                                                                               62.1 8623.65
75.8 8690.84
                                                                                                          62 8645.09
81.48 8697.37
                                                85.95 8756.19
86.11 8857.48
88.52 9063.34
                                                                              80.78 8772.53
87.08 8890.16
                                                                                                          81.37 8785.6
87.69 8916.3
  8707.17
                    85.18 8723.51
                                                                                                                                        84.02
                   85.09 8850.95
88.02 9024.13
  8942.44
                                                                              88.98 9141.76
                                                                                                           89.24 9203.85
                                                                                                                                        88.82
                                                89.9 9370.49
89.56 9586.59
                                                                             89.59 9412.97
89.24 9606.27
                                                                                                          89.72 9432.58
89.34 9681.67
                    89.73 9308.41
                    89.38 9527.58
  9491.51
                                                                                                                                        89.03
   9724.3
                   89.11 9734.13
88.15 9924.29
                                                90.58 9747.25
88.18 9943.96
                                                                             90.75 9773.48
88.01 9993.14
                                                                                                          87.81 9802.98
88.1110061.99
  9868.56
                                                                                                                                        88.02
                   88.4210114.45
89.110471.82
                                                88.41 10229.2
89.3510504.61
88.7910757.06
10075.11
                                                                               89.310265.27
                                                                                                            89.110399.69
                                                                              89.0410543.95
                                                                                                           89.0810599.69
10625 92
                    89 13 10675 1
                                                                              88 5210786 57
                                                                                                           88 2210809 52
                                                                                                                                        88 67
                    88.3910865.26
                                                88.5910875.09
87.4511173.45
                                                                                                                                        86.55
                    87.1611071.81
                                                                              87.3311281.64
11055.42
                                                                                                           86.9411324.26
11363.61
11730.81
                   86.6911432.46
86.3511776.71
                                                86.2711448.85
86.4311852.12
                                                                             86.4811599.67
86.31 11901.3
                                                                                                           86.2411622.62
86.5911970.15
                                                                                                                                        86.43
86.71
                   86.8812006.22
92.9113278.32
                                                86.2213186.52
93.2813307.83
                                                                             86.2213206.19
92.78 13327.5
                                                                                                           86.7213232.42
93.0513370.12
                                                                                                                                        93.72
11983.27
13252.09
13396 35
                   93 09 13419 3
                                                 92 3613461 92
                                                                             92 2913494 71
                                                                                                           92 9513514 38
                                   num= 7
Sta n Val Sta
62.67 .12 8438.79
61.92 .085
   Sta n Val Sta
0 .07 62.67
3890.16 .06613461.92
                                                                  Sta n Val
                                                                                                         n Val
                                                                                                                            Sta
                                                                                                Sta
                                                                             .07 8514.1
                                                                                                          .025 8661.43

        Bank Sta:
        Left Right 8468.26 8890.16
        Lengths:
        Left Channel Right 1772.15
        Right 3068.24 1935.18

        Ineffective Flow Sta L Sta R Elev Permanent
        2
        Permanent

                                                                                                            Coeff Contr.
                                                                                                                                        Expan.
 Sta L Sta R
0 8468.26
8890.1613537.33
                                  91.06
87.69
Left Levee Station= 101.46
Right Levee Station=13537.33
                                                                    Elevation= 104.36
                                                                Elevation= 104.36
1
 Sta L Sta R Elev
1327.76 2584.16 93.58
Blocked Obstructions
 E.G. Elev (ft) 100.81 Element
Vel Head (ft) 0.03 Wt. n-Va
W.S. Elev (ft) 100.78 Reach Le
Crit W.S. (ft) 91.09 Flow Are.
E.G. Slope (ft/ft) 0.000099 Area (sp. 125000.00 Flow (c)
Top Width (ft) 13408.22 Top Widtl
Vel Total (ft/s) 0.92 Ava V-1
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                                                                          Right OB
                                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                     0 120
                                                                                                                                         0.057
                                                                                                                                    10639.32
                                                                                                                                                        56681.41
                                                                   Area (sq ft)
                                                                                                                77168.63
                                                                                                                                   10639.32
                                                                                                                                                        59460.16
                                                                                                                  34094.11
                                                                      Flow (cfs)
                                                                                                                                     23478.50
                                                                                                                                                          67427.39
```

Top Width (ft) Avg. Vel. (ft/s)

0.066

4647.17

421.90

```
Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                   Hydr. Depth (ft)
                                  12533120.0
2157.68
                                                                                                         2354071.0
                                                                                                                         6760606.0
                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                        3418446.0
                                                                                       8348.55
0.05
0.03
                                                                                                        435.27
                                                                                                                      4652.83
                                     59.30
2.05
                                                   Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                          0.08
Alpha
Frctn Loss (ft)
C & E Loss (ft)
                                                                                                           0.33
                                                                                                     32830.26
                                                   Cum Volume (acre-ft)
                                                                                                                     90863.77
                                        0.28
                                                                                     66805.55
                                       0.00
                                                   Cum SA (acres)
                                                                                     11096.71
                                                                                                      1539.82
                                                                                                                     11986.81
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 143 REACH: Lower Reach

Description: RGV-01, new cross-section, Bathymetric elevations translated from

| Descripti | IBWC 2008 Cr | oss-sections, Sec | | | |
|----------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------|
| 0 | 2017 survey | 456 | | | |
| Station E | levation Data
Elev Sta | num= 456
Elev Sta | Elev Sta | Elev Sta | Elev |
| 0 | 90.8 33.35 | 91.19 66.71 | 93.66 127.75 | 100.52 189.25 | 94.12 |
| 250.74 | 86.91 312.24 | 85.67 373.74 | 85.31 435.23 | 86.43 496.73 | 87.21 |
| 558.22
770.67 | 87.3 619.72
89.29 839.55 | 87.17 681.21
89.02 875.63 | 87.15 742.71
89.69 888.76 | 87.72 747.71
89.11 954.36 | 88.9
89.16 |
| 1006.84 | 88.69 1042.92 | 88.91 1065.88 | 89.52 1082.29 | 88.94 1098.69 | 89.89 |
| 1151.17 | 90.06 1167.57 | 90.84 1210.21 | 91.81 1223.33 | 93.39 1233.18 | 92.24 |
| 1262.7 | 92.2 1321.74 | 93.24 1354.54 | 93.19 1387.35 | 94.22 1416.87 | 94.02 |
| 1456.23
1616.96 | 93.13 1521.83
93.58 1676 | 94.34 1528.39
93.37 1702.25 | 93.9 1571.04
93.93 1715.37 | 93.92 1580.88
93.52 1784.25 | 94.5
93.53 |
| 1826.89 | 94.18 1859.7 | 93.25 1885.94 | 93.8 1908.9 | 93.47 1958.1 | 94.24 |
| 1974.5 | 93.61 2010.59 | 93.97 2020.43 | 93.12 2043.39 | 93.16 2082.75 | 94.01 |
| 2131.95 | 93.42 2194.28 | 93.73 2207.4
94.06 2387.81 | 94.55 2217.24
93.4 2407.49 | 93.71 2250.04
93.93 2430.45 | 94.75 |
| 2315.64
2476.37 | 93.4 2348.45
93.94 2486.21 | 93.28 2541.98 | 93.49 2555.1 | 94.04 2581.34 | 93.38
93.45 |
| 2620.7 | 93.92 2650.22 | 93.39 2692.86 | 94.14 2705.99 | 93.54 2742.07 | 94.45 |
| 2778.15 | 93.94 2784.71 | 94.85 2801.11 | 93.87 2817.51 | 94.58 2830.63 | 94.03 |
| 2896.24 | 94.18 2974.96
90.27 3102.89 | 94.68 3007.76
90.1 3148.81 | 94.07 3043.85 | 94.16 3060.25 | 93.05
88.42 |
| 3083.21
3253.78 | 88.94 3280.02 | 89.78 3332.5 | 88.47 3181.61
89.95 3352.18 | 89.02 3191.45
90.97 3388.27 | 91.43 |
| 3414.51 | 90.93 3434.19 | 91.63 3450.59 | | 91.75 3493.23 | 92.43 |
| 3509.63 | 91.9 3535.87 | 93.31 3552.27 | | 92.61 3601.48 | 91.91 |
| 3650.68
3811.41 | 92.06 3670.36
93.18 3834.37 | 92.84 3680.2
93.01 3854.05 | 92.41 3722.84
93.62 3867.17 | 93.61 3735.97
92.98 3893.41 | 92.15
92.88 |
| 3922.94 | 94.55 3942.62 | 92.87 3965.58 | 94.22 3985.26 | 93.57 3995.1 | 94.97 |
| 4008.22 | 94.57 4027.9 | 95.48 4044.3 | 95.16 4054.14 | 96.4 4096.79 | 95.04 |
| 4129.59 | 96.1 4152.55 | 95.17 4168.95 | 96.46 4188.63 | 94.99 4214.87 | 95.5 |
| 4244.39 | 94.69 4257.52
95.42 4392 | 95.01 4300.16
95.69 4434.65 | 94.34 4319.84
94.94 4454.33 | 94.83 4352.64
95.81 4460.89 | 97.11
95.33 |
| 4369.04
4526.49 | 95.42 4392
95.92 4556.01 | 95.06 4565.85 | 95.73 4598.66 | 94.91 4611.78 | 95.45 |
| 4641.3 | 95.4 4674.1 | 92.11 4706.9 | 90.48 4756.1 | 92.78 4805.31 | 91.56 |
| 4838.11 | 91.66 4854.51 | 91.22 4913.55 | 93.59 4923.39 | 92.95 4933.23 | 93.84 |
| 4949.64
5044.76 | 92.41 4975.88 | 92.06 4985.72
89.97 5087.4 | 92.58 5005.4
89.87 5110.37 | 91.53 5011.96
90.67 5156.29 | 89.63
88.86 |
| 5195.65 | 88.54 5067.72
89.73 5254.69 | 89.97 5087.4
89.33 5323.58 | 89.57 5333.42 | | 89.25 |
| 5382.62 | 90.3 5399.02 | 89.9 5435.1 | 90.7 5458.06 | | 90.93 |
| 5520.39 | 90.7 5530.23 | 89.62 5559.75 | 91.57 5589.27 | | 91.54 |
| 5638.48 | 87.53 5687.68
91.46 5851.69 | 88.1 5697.52
90.15 5871.37 | 87.79 5720.48
90.22 5910.73 | 90.86 5799.21
87.21 5933.69 | 91.83
88.79 |
| 5832.01
5946.81 | 88.2 5979.62 | 89.81 5992.74 | 89.8 6009.14 | 87.87 6035.38 | 89.08 |
| 6061.62 | 87.31 6084.58 | 88.05 6097.7 | 89.17 6123.94 | | 88.65 |
| 6160.03 | 87.41 6179.71 | 88.53 6196.11 | 90.3 6209.23 | 89.81 6219.07 | 87.75 |
| 6255.15
6379.8 | 88.88 6271.55
89.05 6409.32 | 88.17 6291.23
90.93 6419.16 | 90.7 6324.04
93.15 6445.4 | 89.43 6347
94.62 6458.52 | 90.15
94.39 |
| 6530.69 | 94.8 6573.33 | 94.01 6599.57 | 94.62 6615.97 | 93.89 6638.93 | 94.39 |
| 6678.3 | 92.3 6701.26 | 93.25 6737.34 | 93.17 6776.7 | 94.42 6819.34 | 93.28 |
| 6842.31 | 91.4 6861.99 | 91.55 6891.51 | 94.94 6901.35 | 92.93 6934.15 | 93.48 |
| 6960.39
7127.68 | 92.14 6980.07
91.86 7157.2 | 93.35 7003.03
92.37 7186.73 | 92.91 7045.68
91.69 7252.33 | 93.12 7078.48
91.2 7304.81 | 93.81
89.84 |
| 7334.33 | 90.48 7367.14 | 90.37 7386.82 | 88.29 7396.66 | 89.04 7429.46 | 88.97 |
| 7452.42 | 93.03 7498.34 | 94.48 7518.02 | 96.08 7534.43 | 94.24 7583.63 | 93.46 |
| 7606.59 | 94.06 7655.79 | 93.68 7682.03 | 93.87 7698.44 | 95.62 7708.28 | 94.3 |
| 7731.24
7882.13 | 93.76 7757.48
92.73 7911.65 | 95.52 7780.44
92.15 7931.33 | 93.29 7800.12
92.57 7944.45 | 93.85 7839.48
91.97 7970.69 | 92.47
92.43 |
| 8010.05 | 91.98 8023.17 | 92.37 8039.58 | 91.57 8069.1 | 91.86 8078.94 | 91.04 |
| 8121.58 | 91.07 8164.22 | 91.52 8229.83 | 90.84 8252.79 | 91.52 8262.63 | 90.94 |
| 8295.43 | 90.64 8324.96
89.79 8466.01 | 91.78 8338.08 | 91.2 8374.16 | 91.46 8390.56 | 90.4 |
| 8433.2
8577.54 | 92.29 8597.22 | 90.67 8482.41
91.82 8603.78 | 90.29 8518.49
92.43 8643.14 | 90.61 8564.42
91.92 8656.26 | 91.52
92.32 |
| 8679.22 | 91.78 8698.91 | 92.07 8708.75 | 90.95 8738.27 | 92.51 8764.51 | 92.53 |
| 8800.59 | 91.86 8823.56 | 92.63 8839.96 | 91.86 8853.08 | 92.27 8905.56 | 91.38 |
| 8918.68
9167.99 | 92.24 8984.29
92.31 9233.59 | 91.36 9020.37 | 91.4 9063.02 | 91.91 9099.1
91.57 9312.32 | 91.87 |
| 9348.4 | | 91.61 9286.08
90.31 9433.69 | 92.46 9299.2
92.09 9463.21 | | 92.14
92.71 |
| 9541.94 | | | 92.22 9646.91 | 92.86 9666.59 | 92.39 |
| 9699.39 | 93.35 9748.59 | 91.27 9768.28 | | 92.57 9860.12 | 92.42 |
| 9869.96 | 93.12 9889.65 | 92.6 9951.97 | 92.46 9968.37 | | 93.36 |
| 10040.54
10129.11 | 92.5710060.22
91.3910178.31 | 90.46 10079.9
93.0910224.23 | 92.6810099.58
93.0710257.04 | 92.32 10112.7
92.2310270.16 | 93.97
93.13 |
| 10316.08 | 93.3510325.92 | 92.8110339.04 | 93.6210348.88 | 92.0310371.85 | 90.8 |
| 10391.53 | 90.7510411.21 | 91.8310421.05 | 91.6110444.01 | 92.7310460.41 | 91.6 |
| 10480.09 | 93.05 10512.9 | 91.1810565.38 | 91.1210588.34 | 91.8810637.55 | 91.88 |
| 10663.79
10785.16 | 92.3210676.91
93.8810798.28 | 93.210719.55
92.910831.08 | 92.0410739.24
94.7410850.77 | 93.0910768.76
93.1310870.45 | 92.03
94.23 |
| 10886.85 | 93.310896.69 | 93.9610922.93 | 92.7710955.73 | 93.910985.26 | 93.95 |
| 11008.22 | 92.7511024.62 | 93.5711050.86 | 93.22 11077.1 | 94.2411086.95 | 93.6 |
| 11132.87 | 93.3311152.55 | 93.7611221.44 | 93.5511237.84 | 90.2511267.36 | 90.09 |
| 11283.76
11467.46 | 87.7511365.77
89.7 11510.1 | 87.9611405.13
89.32 11526.5 | 86.6511421.53
89.7411546.18 | 86.6911451.06
89.2311624.91 | 88.15
89.24 |
| 11634.75 | 87.2511660.99 | 84.811683.96 | 85.1911703.64 | 86.2511729.88 | 81.85 |
| 11762.68 | 77.4711772.52 | 77.8 11792.2 | 75.9411811.89 | 78.2611834.85 | 71.81 |
| 11847.97 | 66.4711891.97 | 58.411927.97 | 56.911937.97 | 56.911947.97 | 56.2 |
| 11956.97
12034.94 | 56.711976.97
66.47 12041.5 | 5612001.97
6712051.35 | 56.512016.97
73.0912074.31 | 55.812028.97
75.3212087.43 | 55.7
79.47 |
| 12100.55 | 81.0312116.95 | 81.6912126.79 | 83.512143.19 | 89.0412162.88 | 89.42 |
| 12176 | 88.912218.64 | 89.7912251.44 | 89.9312280.96 | 90.5712300.65 | 90.27 |
| 12340.01
12500.74 | 90.8312369.53
90.2112517.14 | 90.1212405.62
91.7112540.11 | 90.25 12425.3
90.7912589.31 | 89.7412477.78
93.7912648.36 | 89.65
92.62 |
| _2550.71 | | -112510.11 | -0 | -3.7512010.30 | 22.02 |

```
88.8812818.93
13678.36
13770.21
                       87.8913694.76
94.1813796.45
                                                         91.3413707.88
94.2213809.57
                                                                                             92.5613730.85
93.5213835.81
                                                                                                                                91.7913760.37
93.9913852.22
                                                                                                                                                                    92.66
96.66
                                                        97.2913894.86
                                                                                             98.213914.54
13868.62
                       98.0813878.46
                                                                                                                                97.7613924.38
14026.07 93.24

    Manning's n Values
    num=
    7

    Sta n Val
    Sta n Val
    Sta n Val
    Sta n Val
    Sta n Val

    0 .07 312.24
    .1211729.88
    .0711847.97
    .02512034.94
    .07

    12251.44
    .06612540.11
    .085

Bank Sta: Left Right 11624.9112143.19 889.07 960.39 837.85

Ineffective Flow num 1
Sta L Sta R Elev Permanent 011624.91 89.24 T

Left Levee Station= 127.75 Elevation= 100.52
Right Levee Station=13868.62 Elevation= 98.08

Blocked Obstructions num= 1
Sta L Sta R Elev 011152.55 91.5
                                                                                                                                 Coeff Contr. Expan.
CROSS SECTION OUTPUT Profile #Design Flow
```

| E.G. Elev (ft) | 100.52 | Element | Left OB | Channel | Right OB | |
|--------------------|-----------|------------------------|-----------|-----------|-----------|--|
| Vel Head (ft) | 0.04 | Wt. n-Val. | 0.119 | 0.068 | 0.081 | |
| W.S. Elev (ft) | 100.48 | Reach Len. (ft) | 889.07 | 960.39 | 837.85 | |
| Crit W.S. (ft) | 82.44 | Flow Area (sq ft) | 90862.39 | 14734.03 | 21174.97 | |
| E.G. Slope (ft/ft) | 0.000177 | Area (sq ft) | 91165.23 | 14734.03 | 21174.97 | |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 59957.54 | 39147.74 | 25894.72 | |
| Top Width (ft) | 13897.96 | Top Width (ft) | 11496.80 | 518.28 | 1882.88 | |
| Vel Total (ft/s) | 0.99 | Avg. Vel. (ft/s) | 0.66 | 2.66 | 1.22 | |
| Max Chl Dpth (ft) | 44.78 | Hydr. Depth (ft) | 7.90 | 28.43 | 11.25 | |
| Conv. Total (cfs) | 9389057.0 | Conv. (cfs) | 4503559.0 | 2940483.0 | 1945016.0 | |
| Length Wtd. (ft) | 915.56 | Wetted Per. (ft) | 11504.06 | 532.31 | 1892.53 | |
| Min Ch El (ft) | 55.70 | Shear (lb/sq ft) | 0.09 | 0.31 | 0.12 | |
| Alpha | 2.81 | Stream Power (lb/ft s) | 0.06 | 0.81 | 0.15 | |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 63381.39 | 31936.65 | 89072.64 | |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 10693.22 | 1506.71 | 11841.76 | |
| | | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 142.5 REACH: Lower Reach

Description: RGV-01, Updated on left with new survey to Station 1146.86.

Bathymetric elevations translated from IBWC 2008 Cross-sections,
Section along left levee updated with 2017 survey

Station Elevation Data num = 457

| Station E | Elevation | n Data | num= | 457 | | | | | |
|-----------|-----------|---------|-------|---------|--------|---------|-------|---------|-------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 91.15 | 6 | 91.95 | 16 | 96.69 | 28 | 97.16 | 33 | 95.43 |
| 69.99 | 98.42 | 81.99 | 103.2 | 105.99 | 103.18 | 159.98 | 85.6 | 174.98 | 83.96 |
| 196.97 | 84.9 | 228.97 | 83.57 | 265.97 | 83.31 | 306.96 | 84.15 | 344.96 | 85.49 |
| 425.95 | 87.67 | 506.94 | 87.67 | 551.93 | 88.83 | 585.93 | 91.73 | 632.92 | 92.21 |
| | | | | | | | | | |
| 670.92 | 89.71 | 715.91 | 88.82 | 778.9 | 88.46 | 866.89 | 88.86 | 905.89 | 88.39 |
| 937.89 | | 1026.87 | | 1063.87 | | 1105.86 | | 1146.86 | 89.89 |
| 1174.32 | 91.2 | 1207.12 | 90.49 | 1216.96 | 91.73 | 1262.88 | 91.52 | 1279.28 | 91.98 |
| 1338.32 | 91.83 | 1426.89 | 92.25 | 1440.01 | 91.89 | 1462.97 | 93.08 | 1482.65 | 92.55 |
| 1502.33 | 94.07 | 1544.97 | 93.17 | 1571.21 | 92.13 | 1581.05 | 91.04 | 1600.74 | 92.37 |
| 1626.98 | | 1676.18 | | 1699.14 | | 1718.82 | 85.61 | 1754.9 | 86.15 |
| 1777.86 | | 1843.47 | | 1853.31 | | 1869.71 | | 1882.83 | 87.95 |
| 1945.15 | | | | | | | | | 87.52 |
| | | 1974.67 | | 1997.64 | | 2027.16 | | 2056.68 | |
| 2109.16 | | 2128.84 | | 2197.73 | | 2305.98 | | 2328.94 | 86.84 |
| 2355.18 | | 2394.55 | | 2407.67 | | 2447.03 | | 2469.99 | 87.04 |
| 2512.64 | 87.64 | 2538.88 | 86.35 | 2574.96 | 86.77 | 2607.77 | 85.84 | 2647.13 | 87.36 |
| 2670.09 | 86.14 | 2699.61 | 85.89 | 2778.34 | 87.2 | 2830.82 | 86.75 | 2883.31 | 89.06 |
| 2919.39 | 90.09 | 2985 | | 2994.84 | | 3063.72 | | 3093.25 | 88.3 |
| 3132.61 | | 3142.45 | | 3178.53 | | 3214.62 | | 3240.86 | 87.14 |
| 3250.7 | | 3290.06 | | 3322.87 | | 3362.23 | | 3388.47 | 88.71 |
| | | | | | | | | | |
| 3404.87 | | 3496.72 | | 3506.56 | 88.4 | 3516.4 | | 3588.57 | 88.02 |
| 3608.25 | | 3637.77 | | 3680.42 | | 3690.26 | | 3703.38 | 91.52 |
| 3729.62 | 93.18 | 3742.74 | 92.4 | 3762.42 | 93.14 | 3778.82 | 94.55 | 3788.67 | 92.65 |
| 3801.79 | 92.06 | 3824.75 | 93.55 | 3850.99 | 91.08 | 3877.23 | 91.2 | 3890.35 | 93.02 |
| 3900.19 | 92.23 | 3929.72 | 92.16 | 3942.84 | 93.42 | 3969.08 | 93.83 | 3985.48 | 92.94 |
| 4011.72 | 93 47 | 4018.28 | 92 89 | 4031.41 | 94 22 | 4041.25 | 93 55 | 4074.05 | 94.01 |
| 4080.61 | | 4093.73 | | 4110.13 | | 4146.22 | | 4156.06 | 94.11 |
| 4208.54 | | 4224.94 | | 4241.34 | | 4254.46 | | 4267.59 | 94.21 |
| | | | | | | | | | |
| 4277.43 | | 4352.87 | | 4369.27 | | 4388.96 | | 4434.88 | 94.49 |
| 4444.72 | | 4467.68 | | 4477.52 | | 4516.89 | | 4530.01 | 94.26 |
| 4549.69 | | 4608.74 | | 4628.42 | | 4644.82 | | 4677.62 | 95 |
| 4694.02 | 94.03 | 4726.83 | 94.85 | 4739.95 | 94.12 | 4766.19 | 94.11 | 4792.43 | 94.75 |
| 4798.99 | 94.35 | 4858.04 | 94.82 | 4867.88 | 95.82 | 4884.28 | 94.71 | 4913.8 | 94.88 |
| 4923.64 | 95.68 | 4940.04 | 94.98 | 4959.73 | 95.98 | 4992.53 | 94.43 | 5015.49 | 95.55 |
| 5031.89 | | 5071.26 | | 5094.22 | | 5110.62 | | 5136.86 | 94.68 |
| 5149.98 | | 5182.79 | | 5199.19 | | 5238.55 | | 5264.79 | 96.48 |
| 5300.88 | 94.78 | 5314 | | 5336.96 | | 5373.04 | 89.18 | 5396 | 90.59 |
| | | | | | | | | | |
| 5435.37 | | 5471.45 | | 5517.37 | | 5533.78 | | 5573.14 | 92.2 |
| 5579.7 | | 5605.94 | | 5622.34 | | 5632.18 | | 5658.43 | 91.45 |
| 5678.11 | | 5694.51 | | 5707.63 | | 5750.27 | 88.01 | 5763.4 | 89.23 |
| 5792.92 | 87.49 | 5845.4 | 87.65 | 5861.8 | 88.12 | 5891.33 | 87.63 | 5901.17 | 88.67 |
| 5950.37 | 87.69 | 6002.86 | 87.58 | 6038.94 | 89.46 | 6065.18 | 87.47 | 6084.86 | 88.65 |
| 6091.42 | 90.13 | 6130.79 | 87.13 | 6153.75 | 88.44 | 6179.99 | 87.3 | 6202.95 | 88.07 |
| 6216.07 | | 6239.04 | | 6255.44 | | 6304.64 | | 6324.32 | 91.76 |
| 6360.41 | | 6426.01 | | 6485.06 | 90.02 | 6527.7 | | 6567.06 | 89.49 |
| | | | | | | | | | |
| 6583.47 | | 6593.31 | | 6662.19 | | 6704.84 | | 6714.68 | 89.6 |
| 6786.84 | | 6845.89 | | 6859.01 | | 6881.97 | | 6891.81 | 89.52 |
| 6901.65 | | 6921.33 | | 7019.74 | 87.37 | 7026.3 | | 7055.83 | 87.48 |
| 7068.95 | 88.29 | 7111.59 | 87.66 | 7206.72 | 87.86 | 7288.73 | 87.7 | 7314.97 | 87.43 |
| 7347.77 | 88.77 | 7364.17 | 87.62 | 7377.29 | 89.17 | 7400.26 | 95.49 | 7419.94 | 93.33 |
| 7436.34 | | 7469.14 | | 7498.67 | 92.75 | 7534.75 | | 7547.87 | 92.13 |
| 7603.63 | | 7623.32 | | 7656.12 | | 7672.52 | | 7702.04 | 92.18 |
| 7751.25 | | 7761.09 | | 7800.45 | | 7820.13 | | 7836.53 | 91.98 |
| 7889.02 | | 7915.26 | | 8000.55 | | 8033.35 | | 8069.43 | 91.35 |
| | | | | | | | | | |
| 8112.08 | | 8121.92 | | 8167.84 | | 8295.77 | | 8328.58 | 91.51 |
| 8358.1 | 92.17 | 8384.34 | 91.91 | 8423.7 | 92.09 | 8446.67 | 91.57 | 8469.63 | 91.82 |
| | | | | | | | | | |

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91.18 8518.83
                                                                               94.08 8650.04
                                                          92.91 8617.24
 8679.57
               95.39 8715.65
                                    95.33 8728.77
                                                          94.75 8745.17
                                                                               95.44 8794.38
88.35 8955.11
                                                                                                     94.59
                                                          89.45 9125.68
 8968.23
               89.05 8991.19
                                    88.65 9066.64
                                                                               90.73 9188.01
                                                                                                     89.84
                                                         89.77 9404.51
89.84 9581.64
 9207.69
               90.37 9263.45
                                    90.57 9365.14
                                                                               90.14 9463.55
 9489.79
               91.37 9516.04
                                    89.89 9558.68
                                                                               89.44 9643.97
                                                                                                     89.66
              89.51 9693.17
90.32 9860.46
                                    89.97 9706.29
90.33 9873.58
                                                         89.45 9742.37
90.94 9893.27
                                                                               89.93 9801.42
90.66 9916.23
                                                                                                      91.6
 9824.38
 9932.63
               91.42 9978.55
                                    91.84 9994.96
                                                          92.69 10021.2
                                                                               91.8910090.08
              88.1410293.46
91.26 10503.4
91.110657.57
                                                                               88.5610437.79
91.1710605.09
90.9410755.98
10240.98
                                    88.0910329.54
                                                          88.9410395.15
                                                                                                     89.23
                                    91.3610523.08
10628.05
                                    90.9110683.81
                                                          91.8610710.05
                                                                                                     91.26
              90.3810860.95
90.8511028.24
10792.06
                                    90.3210923.27
                                                          90.6510956.08
                                                                               91.99 10969.2
                                                                                                     90 72
10998.72
                                     90.211041.36
                                                          90.8711074.17
                                                                               91.4111116.81
                                                                                                      92.9
11129.93
              92.4511179.13
95.1811356.27
                                    92.72 11251.3
92.9111369.39
                                                         93.51 11284.1
90.211412.03
                                                                               92.9111303.78
93.2211421.87
                                                                                                     93.33
              91.1111448.12
91.1111582.61
                                                         89.54 11517
90.2311615.41
11441.56
                                    90.07 11467.8
                                                                               90.8311530.12
                                                                                                     90.17
                                    89.8211605.57
11664.61
               90.5311694.14
                                    88.7311720.38
                                                         91.41 11749.9
                                                                               90.4411769.58
                                                                                                     84.78
                                    83.1611858.15
87.2811956.56
                                                         86.9811884.39
86.31 11999.2
                                                                               86.311897.51
86.4612025.44
11799 11
               83.0811828.63
11907.35
               85.0611923.76
              86.0312061.53
81.1912153.38
                                    86.0312091.05
82.1912173.06
                                                         81.4612107.45
76.3112186.18
                                                                               84.4212130.41
74.3412196.02
12051 69
12140.25
                                                         66.04 12238.7
67.7312373.15
12202.58
                73.212212.42
                                     66.5 12218.7
                                                                               60.64 12318.7
                                                                                                     56.94
12389.55
               85.6612396.12
                                    89.9312419.08
                                                          90.6712438.76
                                                                               90.5412501.08
                                                                                                     91.67
12556.85
              92.1612566.69
91.7112661.82
                                    91.4312586.37
92.7912674.94
                                                         91.7712619.17
91.512717.58
                                                                               91.5112632.29
90.95 12747.1
                                                                                                      92.5
12638.86
                                                                                                     91.23
12753 67
               92 0312766 79
                                       9112819 27
                                                         91.2112835.67
                                                                                92 512852 07
                                                                                                     90 78
12884.88
               90.3312927.52
                                     90.412950.48
                                                          90.0813022.65
                                                                               90.0913166.98
                                                                                                     90.91
                                    91.3513209.62
91.8413475.33
13186.66
              92.32 13196.5
                                                          92.4313271.95
                                                                               92.6713311.31
                                                                                                     92.08
                                                         91.6313691.82
92.3413780.39
99.1613882.08
                                                                               92.4313714.79
91.8713813.19
13609.82
               92.3313642.62
                                    91.6213665.58
                                                                                                      91.9
              92.3413747.59
93.4513842.72
                                    91.6413770.55
                                    96.8513859.12
13832.88
                                                                               98.1113905.04
                                                                                                    98.42
13918.16
              93 5113937 84
Manning's n Values
                                   num=
            n Val Sta
.19211720.38
                                  n Val
                                                        n Val
                                    .06612202.58
                                                         .01512373.15
                                                                                .06612501.08
                                                                                                      .074
                                  Lengths: Left Channel Right
741.16 2145.86 2675.39
81.99 Elevation= 103.2
Bank Sta: Left
                                                                                Coeff Contr.
                      Right
                                                                                                     Expan.
12025.4412501.08
Left Levee Station=
Right Levee
                     Station=13859.12
| Sta L | Sta R | Elev | Sta L | Sta R | 31.5511720.56 | 90.4612564.5113976.34
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                     100 35
                                                   Element
                                                                                     Left OB
                                                                                                    Channel
                                                                                                                  Right OR
                                                                                     0.173
741.16
                                                                                                                  0.074
                                                   Wt. n-Val.
                                                   Reach Len. (ft)
  W.S. Elev (ft)
                                      99.85
                                                                                                   2145.86
                                                                                                   11020.26
                                                   Flow Area (sq ft)
                                                                                                                  11060.54
                             0.000107
                                                  Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                                                  100950.10
                                                                                                   11020.26
                                                                                                                  11060.54
                                   125000.00
                                                                                     37375 39
                                                                                                   78699.12
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                  13821.64
                                                                                   11909.24
                                                                                                                  1436.76
                                                                                                     475.64
                                        1 02
                                                                                        0 37
                                                                                                       7 14
                                                                                                                      0.81
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                  12076740.0
                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                      3610983.0
                                                                                                      7603431.0
                                                                                                                      862326.9
                                                                                                    493.17
                                    1657.74
                                                                                    0.06
                                       56.94
                                                   Shear (lb/sq ft)
                                                                                                     0.15
                                                                                                                      0.05
  Alpha
                                       31.19
                                                   Stream Power (lb/ft s)
                                                                                        0.02
                                                                                                       1.07
   Frctn Loss (ft)
                                                                                   61420.83
                                                                                                  31652.74
                                        0.21
                                                   Cum Volume (acre-ft)
  C & E Loss (ft)
                                                   Cum SA (acres)
                                                                                   10454.36
                                                                                                   1495.75
                                                                                                                11809.84
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                   RS: 142
Description: RGV-01, new cross-section, Bathymetric elevations translated from
                 IBWC 2008 Cross-sections, Section along left levee updated with 2017 survey
Station Elevation Data
                                   num=
                                               450
     Sta
0
                         Sta
34.96
               Elev
                                    Elev
                                                 Sta
                                                                               98.39 157.01
86.28 460.34
                                                         94.26 113.47
85.72 399.67
88.48 703.01
                                               69.92
                90.3
                                    91.78
                                                                                                    98.03
              89.24 278.34
87.8 581.68
                                    84.19 339.01
89.09 642.34
                                                                                        460.34
773.61
                                                                                                      86.9
                                                                               84.32
                                                                                                     84.45
  521.01
  783.45
              84.88
88.28
                        845.77
                                    85.43 868.73
87.15 1009.76
                                                         86.79 908.09
87.73 1032.72
                                                                               88.18
                                                                                        957.29
                        996.64
                                                                                87.5 1065.52
                                    87.74 1216.39
87.46 1380.38
87.38 1514.85
              87.88 1177.03
88.23 1357.42
                                                                               87.64 1268.87
87.57 1413.18
 1154 07
                                                          88.08 1252.47
                                                                                                     88 22
                                                           87.8 1406.62
              87.07 1455.82
87.75 1623.09
88.77 1832.99
                                                           87.3 1534.53
                                                                               86.98 1583.73
87.94 1760.84
87.4 1967.47
 1436.14
                                                                                                     86.88
                                                         88.1 1705.08
88.82 1951.07
                                    87.63 1682.12
```

87.44

89.29

88.88

89.69

90.9

91.22

90 3

92.62

93.18

87.76 2138.02 88.89 2305.29 88.79 2521.76 88.55 2725.1 87.7 2833.34

89.24 3121.96

89.58 3243.32 90.36 3449.94

90.36 3633.61

90.52 3912.4

92.71 4181.34

93.03 4309.26 92.59 4410.93

92.37 4574.92

88.43 1859.23

87.24 2065.86 87.99 2216.73

88.37 2406.96

89.75 2669.35

87.84 2784.14

89.64 2928.45 89.24 3072.77

89.58 3181 89.35 3354.83

90.28 3548.34 91.45 3715.61

90.6 3866.48 91.42 3991.12 91.98 4119.03

92.79 4273.18 93.66 4348.61

4496.2

93.23

87.29 2072.42 88.54 2262.65

88.11 2449.6 88.48 2702.15

88.24 2797.26

89.02 2938.29

89.98 3105.56

89.21 3213.8 90.4 3420.43

90.85 3564.74 91.07 3738.57

91 09 3882 88

92.02 4132.15

93.4 4292.86 92.94 4394.53

93.49 4525.72

1803.48

2000.26 2160.97

2338.08

2544.71

2748.06

3020.29

3144.92 3282.67

3459.78

3784 49

4079.67

4210.86

4322.38

4433.89

86.67 2013.38 88.29 2203.61

89.81 2364.32

89.15 2577.51

88.14 2767.74

89.05 2895.65 89.59 3039.97

89.04 3164.6 89.62 3295.79

90.36 3535.22

91 26 3814 01

93.38 4089.51

93.67 4233.82 93.34 4335.49

92.71 4456.85

```
93.43 4784.82
 4889.78
5027.53
                 94.33 4919.3
                                          94.21 4938.97
90.7 5070.17
                                                                    94.73 4945.53
                                                                                            94.25 5011.13
90.33 5109.52
                                                                                                                      93.57
88.75
                                                                    90.93 5099.68
   5129.2
                   88.2 5188.24
                                           87.39 5214.48
                                                                    87.48 5237.44
                                                                                             88.29 5250.55
                                                                                                                      87.56
 5270.23
                 87.52 5293.19
                                           88.52 5322.71
                                                                    89.06 5335.83
                                                                                             88.66 5352.23
 5371.91
                 88.82 5404.7
                                          90.54 5437.5
                                                                    90.54 5457.18
                                                                                             91.62 5476.86
                                                                                                                       91.5
                 92.54 5535.9
92.01 5653.97
                                          91.78 5552.29
91.68 5686.77
                                                                   92.33 5585.09
92.73 5699.88
                                                                                             92.36 5611.33
92.38 5732.68
 5644.13
                                                                                                                      92.68
 5739.24
                 92.15 5781.88
                                          93.07 5854.03
                                                                   92.75 5880.27
92.86 6155.77
                                                                                            93.08 5991.79
92.33 6188.57
                                          92.18 6273.85
90.54 6411.6
91.05 6572.31
 6241.05
                   91.1 6260.73
                                                                    91.24 6300.09
                                                                                             91.32 6323.04
                                                                                                                      89.91
                 91.11 6260.73
91.11 6391.92
92.01 6546.07
90 6647.74
                                                                   91.99 6424.72
92 6591.99
                                                                                            92.11 6447.68
90.75 6608.39
 6526.39
                                                                                                                      90.83
                                                                   90.98 6710.06
91.07 6883.89
 6621.5
6782.21
                                          90.24 6664.14
91.37 6844.53
                                                                                            91.6 6762.54
91.44 6910.13
                 90.42 6808.45
90.37 6969.16
                                                                   90.57 7005.24
89.45 7169.23
90.61 7290.58
89.96 7411.93
89.85 7523.45
 6959.32
                                          89.82 6995.4
89.75 7103.63
                                                                                            89.87 7044.6
91.08 7192.19
                 90.37 6969.16
90.88 7083.95
90.06 7234.82
90.1 7369.3
90.45 7493.93
                                          90.1 7244.66
90.75 7388.97
89.37 7513.61
                                                                                            90.95 7297.14
89.82 7464.41
90.84 7552.96
 7205.31
                                                                                                                       90.4
  7484.09
                                                                                                                      89.96
 7572.64
7713.67
                 90.86 7625.12
92.43 7756.31
                                          91.2 7634.96
92.15 7769.43
                                                                   91.87 7671.04
92.71 7798.95
                                                                                            92.69 7684.15
92.82 7848.14
                                                                                                                      92.35
                 91.41 7894.06
91.59 8094.13
                                          91.77 7936.7
91.12 8143.32
                                                                   90.84 7959.66
92.14 8189.24
                                                                                            91.29 8018.69
91.62 8208.92
 7884.22
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                                                                                            92.4 8353.23
88.11 8461.47
87.83 8595.94
87.94 8776.34
88.32 9005.93
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92.54 8448.35
87.59 8579.54
                 91.69 8277.8
91.89 8405.71
 8251.56
                                          91.77 8287.64
                                                                                                                      91.77
                                          93.01 8422.11
87.77 8530.35
87.94 8697.62
88.59 8917.37
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8815.69
                 87.87 8687.78
88.02 8832.09
                                                                   88.32 8736.98
88 8963.29
                                            88.5 9127.28
                                                                   88.78 9212.56
   9074 8
                 88.54 9120.72
                                                                                             89.16 9245.36
                                                                                                                      90 72
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88.56 9455.27
                 91.22 9297.83
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89.78 9986.6
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90.03 9570.06
                                                                   89.14 9497.91
90.83 9615.98
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91.05 9806.21
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90.39 9953.81
88.64 10068.6
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                                                                                            90.3310468.47
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                                          92.5211114.11
92.7811251.76
                                                                                            93.1911159.99
91.5211294.36
11091.17
                 88.24
                             11101
                                                                   94.41 11130.5
                                                                                                                      92.88
                 93.6911218.98
                                                                   93.0911277.98
                 92.2311350.08
91.4111546.72
 11317.3
                                          92.55 11376.3
                                                                   92.2111454.95
                                                                                              92.211500.83
                                                                                                                      91.96
                                                                   92.9511615.54
91.111864.75
                                            92.811579.49
                                                                                            93.4911635.21
11671.26
                 90.88 11772.9
                                          90.85 11838.5
                                                                                              91.911897.55
                                                                                                                      92.13
                 91.7411940.19
91.2612133.73
                                          90.7411982.83
92.3212202.61
                                                                   90.4712064.84
91.3612225.58
                                                                                            90.82 12087.8
91.5712251.82
11923.79
                                                                                                                       89.9
12100.92
                                                                   91.3812448.63
91.2212789.78
90.3313193.26
12310 86
                 91.2712353.51
                                           90 9212399 43
                                                                                              91 112560 16
                                                                                                                      90 96
                                                                                              90.213206.38
12943.96
                 90.4412983.32
                                            90.613039.08
                                                                                                                      89.55
13242.46
                 90.5713281.82
                                           89.7213396.63
                                                                   89.7313498.32
                 89.5 13668.9
92.74 13734.5
93.2413941.16
13652.49
                                          89.2213698.42
                                                                     90.813704.98
                                                                                                 8713711.54
                                                                                                                      86.18
                                                                                              92.713901.79
13727 94
                                           93.8413757.46
                                                                   91.8613839.47
92.9714019.88
                                                                                             92.4914075.65
                                          93.3914006.76
13914.92
                                                                                                                        92.6
                 92.2514134.69
89.7214305.27
                                                                                             91.5614210.14
89.75 14384
14082 21
                                          92.2814144.54
                                                                   91.8514193.74
                                                                                                                      90.59
                                                                                            93.2414557.85
14393.84 94.0614406.96
                                          96.8914446.32
                                                                   97.2914462.72
Manning's n Values
                                       num=
                                                          6
       Sta n Val Sta n Val Sta 0 .07 113.47 .12 10681.5 4.11 .066
                                                                  n Val Sta
.0710920.75
                                                                                              .02511032.18
11114.11

        Bank Sta: Left
        Right
        Lengths: Left Channel

        10838.81
        11101
        2632.84 1550.77 1

        Ineffective Flow
        num=
        1

        Sta L
        Sta R
        Elev

        010838.81
        90.1
        T

                                                                             Right
                                                                                            Coeff Contr.
                                                                                                                    Expan.
                                        2632.84 1550.77 1580.34
1
                               90.1 1
'cm= 113.47
Left Levee
                                                        Elevation= 98.39
Elevation= 97.29
                         Station=
Right Levee Station= 113.47
Right Levee Station=14446.32
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                   Left OB 0.118
                                                           Element
Wt. n-Val.
                                                                                                                                     Right OB
   Vel Head (ft)
                                              0.04
                                                                                                                       0.053
   W.S. Elev (ft)
Crit W.S. (ft)
                                                           Reach Len. (ft)
Flow Area (sq ft)
                                                                                                                    1550.77
7588.28
                                                                                                                                     1580.34
                                             99.96
                                                                                                   2632.84
                                                                                          97384.50
107371.70
66104.98
   E.G. Slope (ft/ft) 0.000156
Q Total (cfs) 125000.00
Top Width (ft) 14557.85
                                                           Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                                                      7588 28
                                                                                                                                     29786 36
  E.G. Slope (it/it)
Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                        125000.00
                                                                                                                    23764.27
                                        14557.85
                                                                                                 10838.81
                                                                                                                      262.19
                                                                                                                                      3456.85
                                               0.93
                                                                                                                        3.13
                                             44.16
                                                                                                                       28.94
                                                                                                        8.98
                                                                                                                                           8.62
   Conv. Total (cfs)
Length Wtd. (ft)
                                        10006810.0
1967.27
                                                           Conv. (cfs)
Wetted Per. (ft)
                                                                                                     5292001.0
                                                                                                                       1902437.0
                                                                                                                                          2812375.0
                                                                                                 10856.35
                                                                                                                      0.26
                                                           Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                  0.09
0.06
   Min Ch El (ft)
                                             55.80
                                                                                                                                          0.08
   Alpha
   Frctn Loss (ft)
                                                           Cum Volume (acre-ft)
                                                                                                 59648.56
                                                                                                                                    87508.25
                                               0.25
                                                                                                                  31194.39
                                                                                                                   1477.58
                                                           Cum SA (acres)
Warning: The cross-section end points had to be extended vertically for the computed water surface.
             Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                        RS: 141.9
TNPIIT
Description: RGV-01, Updated on left with new survey to Station 1106.92.

Bathymetric elevations translated from IBWC 2008 Cross-sections,
                    Section along left levee updated with 2017 survey ation Data num= 453
Station Elevation Data num=
Sta Elev Sta Ele
```

Sta Elev 0 95.38

Elev

Elev

46 103.31

Elev

| 114
282.98 | 86.31 138.99
85.83 310.98 | 82.78 152
86.69 364 | | 84.24 219.99
85.67 447.97 | 84.75
85.2 | |
|--------------------------|--------------------------------|--------------------------|--|--------------------------------|----------------|----------|
| 504.96 | 86.25 517.96 | 85.67 548 | .96 85.96 597.96 | 85.96 635.95 | 87.57 | |
| 684.95
885.94 | 88.56 725.95
85.83 915.93 | 88.69 801
82.01 937 | | 87.36 842.94
80.72 1106.92 | 87.22
81.65 | |
| 1328.43
1430.11 | 83.92 1348.11
86.34 1469.48 | 84.55 1371
87.1 1489 | | 86 1420.27
88.3 1548.2 | 86.76
87.97 | |
| 1558.04
1741.72 | 88.37 1590.84
89.13 1774.52 | 88 1623
89.47 1790 | .64 88.68 1663 | 88.86 1712.2
89.13 1869.64 | 89.58
89.86 | |
| 1895.88 | 89.81 1922.12 | 90.34 197 | 4.6 90.13 1987.72 | 89.45 2007.4 | 89.8 | |
| 2020.52
2148.44 | 89.32 2059.88
88.53 2164.84 | 89.85 2
88.96 2194 | | 88.99 2128.76
88.88 2217.32 | 89.42
88.37 | |
| 2259.97
2381.33 | 88.64 2269.81
88.66 2410.85 | 89.2 2299
89.2 2417 | | 88.61 2374.77
89.28 2483.01 | 89.08
89.03 | |
| 2496.13 | 88.48 2535.49 | 89.22 2568 | .29 89.51 2594.53 | 89.3 2630.61 | 89.95 | |
| 2640.45
2771.65 | 89.63 2679.81
89.96 2833.97 | 89.75 2702
90.66 2856 | .93 90.43 2879.89 | 89.6 2758.53
90.88 2889.73 | 90.35
91.62 | |
| 2948.77
3034.06 | 91.23 2971.73
93.29 3099.66 | 91.28 2981
93.42 3119 | | 92.2 3017.66
93.3 3191.5 | 94.52
93.49 | |
| 3214.46
3355.5 | 94.07 3237.42
95.03 3371.9 | 93.55 3250
90.7 3378 | | 93.99 3342.38
91.25 3430.94 | 93.44
91.15 | |
| 3470.3 | 90.24 3483.42 | 90.92 3526 | .06 90.07 3558.86 | 90.63 3598.22 | 89.41 | |
| 3627.74
3722.86 | 89.32 3634.3
88.98 3758.95 | 88.78 365
89.02 3804 | .87 89.9 3867.19 | 89.2 3709.74
89.37 3893.43 | 89.68
88.68 | |
| 3932.79
4083.67 | 88.66 3975.43
89.48 4123.03 | 89.46 3995
88.9 4152 | | 88.29 4047.59
89.72 4198.48 | 88.89
90.26 | |
| 4214.88
4326.41 | 90.11 4237.84
90.24 4352.65 | 91.04 424
89.55 4392 | | 90.8 4300.17
90.29 4467.46 | 89.95
89.52 | |
| 4496.98
4664.28 | 90.58 4533.07
89.68 4697.08 | 89.6 4552
90.39 472 | | 89.31 4657.72
90.54 4792.21 | 89.94
89.91 | |
| 4802.05 | 90.18 4825.01 | 89.54 4831 | .57 88.46 4844.69 | 88.18 4870.94 | 86.58 | |
| 4893.9
4998.87 | 89.16 4933.26
87.96 5015.27 | 89.14 494
87 5028 | .39 88.63 5041.51 | 88.92 4985.74
88.81 5061.19 | 87.02
87.15 | |
| 5087.43
5189.12 | 87.54 5100.55
88.29 5205.52 | 88.17 5113
89.21 5228 | | 87.55 5156.32
89.47 5297.37 | 88.87
89.37 | |
| 5320.33
5438.42 | 88.36 5359.7
88.56 5451.54 | 89.26 5385
88.4 5461 | | 87.54 5422.02
87.69 5520.43 | 87.46
88.51 | |
| 5543.39
5664.76 | 88.34 5566.35
90.04 5687.72 | 89.06 5582
90.44 5694 | .75 88.77 5609 | 89.01 5654.92
90.81 5799.25 | 90.4
91.13 | |
| 5815.65 | 91.44 5871.42 | 91.25 5897 | .66 90.79 5937.02 | 91.98 5946.86 | 90.78 | |
| 5963.27
6104.32 | 91.31 5992.79
91.25 6146.96 | 90.82 6032
90.67 6160 | .08 91.23 6166.64 | 90.39 6064.95
90.57 6225.69 | 91.13
91.11 | |
| 6251.93
6363.46 | 90.94 6284.73
93.61 6386.42 | 91.2 6317
91.85 6412 | | 93.45 6353.62
92.23 6484.83 | 92.56
92 | |
| 6491.39
6599.64 | 92.51 6514.35
92.12 6612.76 | 91.95 6547
93.44 662 | .15 93.96 6570.12 | 93.07 6583.24
93.31 6658.68 | 92.06
92.98 | |
| 6665.24 | 93.64 6694.77 | 93.35 6704 | .61 92.75 6770.21 | 93.29 6786.61 | 92.89 | |
| 6803.02
6934.23 | 93.6 6842.38
93.4 6950.63 | 93.39 6852
93.83 6970 | .31 92.83 6983.43 | 92.72 6904.7
93.04 7003.11 | 94.4
92.09 | |
| 7016.23
7140.88 | 90.63 7039.2
90.82 7190.09 | 90.55 7078
90.94 7206 | .49 91.39 7226.17 | 90.46 7131.04
89.78 7242.57 | 90.1
89.7 | |
| 7255.69
7386.9 | 90.73 7268.81
85.33 7455.79 | 90.18 7298
85.43 7547 | | 85.92 7350.82
85.08 7636.21 | 85.06
85.31 | |
| 7649.33
7869.1 | 85.09 7701.81
86.41 7931.43 | 85.7 7734
87.47 7957 | | 85.96 7796.94
88.31 7997.04 | 85.87
87.92 | |
| 8065.92
8403.79 | 87.71 8161.05
89.4 8410.35 | 88.23 8184
89.05 8443 | .01 88.65 8233.21 | 88.55 8315.22
89.91 8525.16 | 89.29
89.98 | |
| 8557.96 | 90.5 8580.92 | 90.05 8603 | .89 90.44 8617.01 | 90.01 8633.41 | 90.57 | |
| 8646.53
8771.18 | 90.34 8682.61
92.01 8794.14 | 91.7 871
91.99 8836 | .79 90.96 8853.19 | 91.79 8761.34
91.13 8866.31 | 91.42
92.11 | |
| 8876.15
9010.64 | 91.48 8899.11
90.95 9027.04 | 92.14 8938
91.12 9053 | | 91.44 8977.84
89.72 9118.68 | 92.18
89.18 | |
| 9157.93
9269.14 | 89.08 9174.28
91.98 9285.5 | 89.92 9197
91.67 9298 | | 89.02 9246.25
92.7 9344.38 | 89.74
86.72 | |
| 9370.54
9455.59 | 82.38 9383.63
74.51 9475.22 | 82.85 940
76.31 9485 | 9.8 77.62 9422.88 | 78.61 9439.24
73.58 9504.66 | 77.28
66.24 | |
| 9511.2 | 59.8 9533.2 | 59.2 956 | 4.2 59.31 9593.2 | 57.57 9601.2 | 57.51 | |
| 9634.2
9714 | | | .08 87.38 9730.36 | 66.07 9691.1
88.13 9746.71 | | |
| | 90.78 9877.55 | 91.3310041 | .59 91.79 9831.76
.33 91.4110159.39 | | 91.91 | |
| 10261.05 | 91.9310306.96 | 92.34 1031 | 5.8 92.9410320.08
.19 91.810687.36 | 91.8210329.92
91.0910703.76 | 92.19
91.2 | |
| 10775.92 | 90.9310913.74 | 90.6810923 | .19 91.810687.36
.58 90.4410976.08
.32 90.3911238.57 | 90.4511081.08 | 91.2
90.7 | |
| 11291.07 | 90.5311310.76 | 89.7211346 | .85 89.9811359.98 | 92.1311363.26 | 90.98 | |
| 11369.82
11629.04 | 90.1911773.41 | 90.211405 | .91 88.9611435.45
.94 90.1611989.97 | 90.1412016.22 | 90.29 | |
| 12170.43
12406.68 | 90.2512229.49
89.8212446.05 | 90.112268
90.212452 | .94 90.1611989.97
.87 90.24 12298.4
.62 89.6312475.58
.83 90.0712895.58 | 90.0212390.27
90.1912544.49 | 90.34
90.28 | |
| 12619.96
12977.61 | 90.0912731.52
90.1413069.48 | 90.2112816
89.87 1313 | .83 90.0712895.58
5.1 89.8613226.98 | 90.2512934.95
90.0213312.29 | 90.02
89.86 | |
| 13391.04 | 90.1113430.41 | 89.713476 | .35 90.5113489.47
.69 89.313620.72 | 91.7213499.32
88 7713663 38 | 91.62
89.01 | |
| 12720 | 00 7712701 62 | 00 0012070 | 02 99 661/1122 50 | 99 6/1/171 96 | QQ 27 | |
| 14247.43 | 89.0714204.77 | 90.33 1427 | 0.4 89.69 14234.3 | 87.24 14322.9 | 86.78 | |
| 14365.55
14470.55 | 87.3614381.96
95.7914477.11 | 88.2714401
96.6714513 | .74 89.69 14234.3
0.4 89.6314280.24
.64 87.1514427.89
.21 97.5314532.89 | 87.3914454.14
93.2114641.17 | 90.66
93.21 | |
| 14651.01 | 96.314673.98 | 95.914677 | .26 95.2 | | | |
| Manning's
Sta | n Values
n Val Sta | num=
n Val | 5
Sta n Val Sta
.94 .07 9455.59 | n Val Sta | n Val | |
| 0
9861.2 | .066 30 | .12 9314 | .94 .07 9455.59 | .025 9691.1 | .07 | |
| | | Lengths: Is | ft Channel Pight | Coeff Contr | Expan | |
| 931 | 14.94 9861.2 | 29: | ft Channel Right
97 3385 3501.58 | .1 | .3 | |
| Sta I. | Sta P Fletz | Dermanent | | | | |
| 0 9
9861.214 | 9314.94 92.7
1677.26 91.91 | T
T | | | | |
| Left Levee
Right Leve | Station=
ee Station=1 | 46
4513.21 | Elevation= 103.31
Elevation= 97.53 | | | |
| | TION OUTPUT Pro | | | | | |
| | | | | I.eft ∩R | Channel | Right OR |
| Vel Head | 1 (ft) | 0.19 | Wt. n-Val. | 0.120 | 0.029 | 0.066 |
| Crit W.S | 3. (ft) | 83.09 | Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft) | 62584.70 | 13502.50 | 36135.36 |
| E.G. 510 | PG (IC/IC) | J.UUU1U4 | area (py IL) | 20100.42 | 13302.50 | 174/3.43 |

| Q Total (cfs) | 125000.00 | Flow (cfs) | 28293.95 | 64918.89 | 31787.18 |
|-------------------|------------|------------------------|-----------|----------|--------------|
| Top Width (ft) | 14607.18 | Top Width (ft) | 9244.86 | 546.26 | 4816.06 |
| Vel Total (ft/s) | 1.11 | Avg. Vel. (ft/s) | 0.45 | 4.81 | 0.88 |
| Max Chl Dpth (ft) | 43.82 | Hydr. Depth (ft) | 6.77 | 24.72 | 7.50 |
| Conv. Total (cfs) | 12244990.0 | Conv. (cfs) | 2771672.0 | 6359447 | .0 3113869.0 |
| Length Wtd. (ft) | 3324.83 | Wetted Per. (ft) | 9252.92 | 562.19 | 4825.67 |
| Min Ch El (ft) | 55.73 | Shear (lb/sq ft) | 0.04 | 0.16 | 0.05 |
| Alpha | 9.87 | Stream Power (lb/ft s) | 0.02 | 0.75 | 0.04 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 53496.86 | 30818.97 | 86164.46 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 9653.89 | 1463.19 | 11509.49 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 141.5

INPUT

Description: RGV-01, new cross-section, Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with

2017 survey Station Elevation Data Sta Elev Sta Elev Sta Elev Elev 35.03 70.06 96.7 177.81 85.96 484.92 87.31 745.11 90.89 91.62 83.57 92.76 123.94 85.58 423.5 95.83 300.65 607.76 85.82 85.92 730.61 817.25 546.34 85.86 85.91 669 18 86.32 88 24 784.46 771.34 89.25 89.89 89.57 88.13 804.14 846.77 87.7 935.31 89.14 1069.75 873 86.44 912.35 87.99 954.98 87.82 984.49 88.82 1027.12 1125.5 84.37 1132.06 83.92 1469.82 83.92 1486.21 85.59 1525.56 87.72 89.27 1607.54 89.34 1817.41 90.02 1643.62 88.44 1833.81 88.31 1709.2 88.23 1892.84 89.48 1676.41 1866.6 1781.34 88.73 88.58 90.23 1991.21 89.48 1942.02 89.89 2050.24 89.6 2001.05 90.73 2178.12 1922.35 90.49 1978 1 90 02 2030.56 90.42 2125.66 90.09 2155.17 2217.47 91.36 2227.31 91.08 2250.26 89.06 2276.5 87.29 2289.61 86.94 2499.48 89.83 2525.71 90.28 2561.78 90.04 2588.01 90.56 2604.41 90.1 2620.8 2709.34 90.82 2640.48 90.28 2738.85 90.19 2656.87 91.21 2781.48 90.29 2702.78 92.43 2801.15 90.79 2666.71 91.39 2794.6 92.03 92.34 2863.46 93.04 3011.02 93.1 2909.36 92.32 3024.13 93.18 2938.88 91.49 3047.09 92.76 2974.95 91.41 3076.6 2850.34 92.62 2988.06 92.69 3181.53 3089.72 93.54 3119.23 93.66 3142.18 93.35 3155.3 88.27 85.99 3273.35 86.72 3302.86 87.72 3312.69 88.55 3378.28 89.38 3427.46 89.51 3506.16 3335.65 89.5 3443.86 89.24 3453.7 89.87 89.32 3499.6 89.77 3617.65 89.83 3640.61 89.44 3660.28 3568.47 89.82 3709.47 88.89 3761.93 3889.82 89.18 3837.35 88.81 3975.07 88.82 3853.75 89.22 4004.59 89.43 3863.58 88.9 4086.56 88.8 3811.12 89.08 3909.49 87.28 86.54 4306.28 87.29 4483.36 87.13 4604.69 4155 43 86.66 4194.78 86 08 4270 2 86 71 4280 04 87 16 86.73 4424.33 87.64 4532.55 87.14 4368.58 87.44 4525.99 87.45 87.17 4562.06 4499.76 87.91 88.09 4667 88.47 4775.22 88.42 4689.95 4712.91 88.74 4735.86 88.65 4817.85 87.95 4850.64 88.11 4903.11 89.28 4916.23 89.01 4942.46 89.07 5057.24 89.53 4981.81 89.4 5080.19 89 13 4991 65 88.18 5024.44 88.96 5096.59 5011.33 88.14 89.44 5149.06 89.58 5267.11 89.37 5185.13 89.21 5375.33 5122.82 88 65 5172 01 89.15 5234.32 89.19 5296.62 89.88 5427.8 90.05 5450.75 89.79 5519.62 89.83 5545.85 89.53 5588.48 90.13 89.4 5634.39 89.97 5739.33 90.02 5650.79 89.59 5759.01 89.71 5673.74 89.95 5788.52 90.08 5686.86 5726.21 89.6 5814.75 89.89 90.37 5873.78 5821.31 90.41 5834.43 89.91 5844.27 90.73 5900.02 92.5 6060.7 88.77 6162.36 87.03 6303.37 5952.48 91.26 6024.63 91.98 6086.94 92.62 6100.05 92.18 88.71 6178.76 86.95 6313.21 87.61 6214.83 86.52 6359.12 6116.45 90.54 6152.52 87 29 87.28 6260.74 6405.03 86.03 6450.94 86.53 6470.59 85.95 6490.24 86 6532.81 87.28 87.13 6640.89 87.73 6676.92 88.03 6778.44 88.05 6581.94 6706.39 88.15 6726.04 89.04 6745.69 6758.79 89 85.6 6801.37 85.7 6827.57 88 6837.39 89.59 6853.77 90.69 6873.42 87.21 6899.62 83.15 6909.44 81.76 6922.54 80.94 6948.75 6883.24 80.88 81.22 7001.15 81.58 7060.1 83.41 7122.32 83.44 7010.97 83.27 7073.2 85.49 7017.52 82.61 7079.75 85.39 7040.45 83.05 7099.4 6974.95 7112 5 79.74 7128.87 79 12 7148 52 78 34 7138 7 78 5 76 7168.17 66.05 7244.92 77.8 7181.27 57.98 7280.92 77.26 7187.82 56.48 7290.92 56.48 7300.92 7200.92 55.78 7309.92 7377.78 56.28 7329.92 81.74 7384.33 55.58 7348.3 87.29 7390.88 66.07 7361.4 90.97 7397.43 71.94 7367.95 92.28 7410.53 91.65 7430.18 7525.15 91.1 7462.93 39.89 7633.23 90.01 7498.95 90.62 7643.06 92.27 7440 90.08 7446.55 91 17 90.01 7554.63 90.38 7580.83 89.89 89.83 7849.38 89.04 8137.66 89.64 8475.53 7692 18 90 11 7744 58 89 79 7796 98 89 46 7964 01 89 41 89.44 8416.49 8255.75 89.36 8400.08 89.58 8534.58 89.86 89.98 8787.16 89.95 9046.3 8580.5 89.77 8774.04 89.83 8862.6 89.85 8961.01 89.64 9033.18 90.81 9052.86 9016.78 9046.3 9128.3 90.08 9069.26 91.69 9085.66 89.64 9098.78 90.2 9338.24 90.6 9128.3 90.41 9387.45 90.33 9170.95 90.77 9187.35 88.13 9951.65 92.0510040.22 9512.1 89.71 9630.19 89.53 9689.23 88.84 9833.56 88 22 88.1910020.54 92.47 10027.1 10050.06 90.88 10076.3 90.7410092.71 91.1310128.79 90.910164.87 91.26 10207.51 90.9710223.92 91.3910315.76 91.2710381.37 91.610414.17 91.5710712.68 91.0710732.36 92.5610745.48 10588.03 91.6710683.15 91.33 10863.57 91.2710873.41 91.2611122.71 91.0410922.61 90.9811148.95 91.6110965.26 91.111211.28 91.610994.78 90.7411221.12 11070.23 11352.33 90.511404.81 90.6411486.82 90.4911578.67 90.6411640.99 90.47 90.6211801.73 90.4511834.53 11660.68 90.6911844.37 11850.93 90.5811896.86 90.8711995.26 91.0412008.38 91.2212093.67 91.23 90.8712234.72 89.9412277.37 91.612241.28 89.512283.93 12251.12 91.8812260.97 88.6212293.77 89.27 12375.78 89.0712444.66 89.512831.73 89.0712457.78 89.5112933.42 89.2212572.59 89.4412956.38 89.212690.68 89.2513044.95 12782.53 89.35 89.3713327.05 89.5213395.94 13104 89.2513182.72 89.4813222.09 89.313304.09 89.16 89.6613356.58 13438 58 89 5213661 64 89 2313714 13 89 4513733 81 89 213809 25 89 42 89.1414255.37 14114.32 89.2714219.29 89.3714294.74 89.114517.79 89.08 89.1514589.96 89.3214642.44 89.2514717.89 89.4414760.53 89.4314937.67 89.42 89.23 14780.22 89.1314826.14 89.6214842.54 89.3514891.75 89.4915039.36 87.2215213.21 89.3715108.24 87.2715219.77 14970.47 89.4815137.77 89.2415200.09

```
90.3815301.78
                                                                       87.5815334.58
15357.54
15442.83
                  88.5715373.95
                                             88.9215396.91
                                                                       90.715406.75
9715482.19
                                                                                                  92.415419.87
93.1715590.44
                                                                                                                             93.42
93.17
                                                                         96.515639.65
     15597
                  93.3815610.12
                                             97.3715633.09
                                                                                                  94.8415659.33
15669.17 92.7315672.45
Manning's n Values num= 6
Sta n Val Sta n Val Sta
0 .07 123.94 .12 7161.62
                                                             6
Sta n Val Sta
1.62 .07 7200.92
                                                                                                n Val Sta
.025 7462.93
                                                                                      Sta
                                                                                                                   Sta n Val

        Bank Sta: Left
        Right
        Lengths: Left
        Channel
        Right

        6853.77
        7397.43
        1939.57
        3724.88
        726.46

        Ineffective Flow
        num=
        2
        2

        Sta L
        Sta R
        Elev
        Permanent

                                                                                                    Coeff Contr.
    Sta L Sta R
0 6853.77
                               90.69
92.28
  7397.4315672.45
                                                           Elevation= 96.7
Elevation= 97.99
                                          123.94
Left Levee Station= 123.94
Right Levee Station=15469.07
Blocked Obstructions num=
     Sta L Sta R Elev
0 6086.94 90.62
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                         Left OB
                                                                                                                                              Right OB
                                                              Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
   Vel Head (ft)
                                                  0.02
                                                                                                            0.119
                                                                                                                               0.088
                                                                                                                                                  0.065
                                                                                                                                              726.46
   W.S. Elev (ft)
Crit W.S. (ft)
                                              99.22
86.63
                                                                                                         1939.57
                                                                                                                            3724.88
                                                                                                        56770.18
                                                                                                                          12924.08
                                                                                                                                             56833.68
   Crit W.S. (ft) 86.63

E.G. Slope (ft/ft) 0.000179

Q Total (cfs) 125000.00

Top Width (ft) 15672.45

Vel Total (ft/s) 0.99

Max (hl. Toth (ft))
                                                               Area (sq ft)
                                                                                                        59621.14
                                                                                                                         12924.08
                                                                                                                                             75549.06
                                                                Flow (cfs)
                                                                                                         38793.85 23740.71
                                                                                                                                              62465.44
                                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                         6853.77
                                                                                                                             543.66
                                                                                                                                              8275.02
                                                                                                                              1.84
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                43.64
                                                                                                              8.28
                                                                                                                                                   6.87
                                           9343602.0
                                                                                                          2899794.0 1774590.0
                                                                                                             1/74590
03.89 561.31
0.09 0.26
0.06 0 0
                                      9343602.0
1603.30
                                                                                                                                             8290.52
                                                                                                         6863.89
                                                55.58
                                                               Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                                                   0.08
   Alpha
   Frctn Loss (ft)
                                                               Cum Volume (acre-ft)
                                                                                                                         29792.18
                                                 0.19
                                                                                                      48136.95
                                                                                                                                           81347.68
   C & E Loss (ft)
                                                 0.00
                                                             Cum SA (acres)
                                                                                                         9100.08
                                                                                                                          1420.84 10983.32
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                           RS: 140 74
```

INPUT

Description: RGV-01, Updated on left with new survey to Station 1591.79.

Bathymetric elevations translated from IBWC 2008 Cross-sections, Section along left levee updated with 2017 survey
Station Elevation Data num= 413

| Station | Elevation | n Data | num= | 413 | | | | | |
|--------------------|-----------|---------|--------|---------|--------|-------------------|-------|-------------------|-------|
| Sta | | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | | 10 | 90.23 | 23 | 96.65 | 60 | 95.25 | 85.99 | 97.74 |
| 105.99 | | 123.99 | 103.08 | 193.98 | 83.77 | 209.98 | 81.35 | 231.98 | 81.34 |
| 245.97 | 82.95 | 297.97 | 83.16 | 412.95 | 84.39 | 514.94 | 85.14 | 592.93 | 87.69 |
| 813.9 | 87.31 | 840.9 | 86.86 | 863.89 | 84.85 | 911.89 | 85.08 | 951.88 | 87.17 |
| 983.88 | 87.18 | 1018.87 | 84.72 | 1147.85 | 85.87 | 1262.84 | 86.52 | 1421.81 | 86.35 |
| 1438.81 | 88.05 | 1458.81 | 87.95 | 1503.8 | 82.13 | 1517.8 | 81.35 | 1591.79 | 81.27 |
| 2069.85 | 83.56 | 2076.42 | 84.44 | 2092.82 | 83.56 | 2617.66 | 83.56 | 2647.19 | 83.72 |
| 2693.11 | 83.59 | 2752.15 | 84.17 | 2781.68 | 83.78 | 2801.36 | 84.24 | 2811.2 | 84.05 |
| 2844 | 84.46 | 2857.12 | 84.42 | 2889.93 | 85 | 2932.57 | 85.06 | 2945.69 | 85.42 |
| 2998.18 | 85.33 | 3040.82 | 85.75 | 3090.03 | 86.96 | 3145.79 | 86.88 | 3175.31 | 87.26 |
| 3185.15 | 87.72 | 3208.12 | 87.36 | 3234.36 | 87.72 | 3247.48 | 87.55 | 3273.72 | 88.03 |
| 3293.4 | 87.73 | 3319.65 | 87.91 | 3329.49 | 88.33 | 3359.01 | 88.1 | 3391.81 | 88.74 |
| 3411.49 | 88.72 | 3427.9 | 88.27 | 3437.74 | 88.45 | 3447.58 | 87.91 | 3463.98 | 88.76 |
| 3477.1 | 88.57 | 3493.5 | | 3513.18 | | 3516.46 | 88.63 | 3526.3 | 83.09 |
| 3532.87 | | 3539.43 | | 3552.55 | | 3562.39 | | 3568.95 | 66.93 |
| 3589.23 | 59.96 | 3609.23 | | 3649.23 | 59.76 | 3709.23 | | 3719.23 | 64.46 |
| 3732.96 | | 3749.36 | | 3759.21 | | 3772.33 | | 3798.57 | 83.66 |
| 3808.41 | | 3818.25 | | 3828.09 | | 3841.21 | | 3857.61 | 84.91 |
| 3867.45 | | 3874.02 | | 3880.58 | | 3890.42 | | 3900.26 | 87.24 |
| 3916.66 | | 3933.06 | | 3949.46 | | 3982.26 | | 4008.51 | 89.64 |
| 4018.35 | | 4034.75 | | 4064.27 | | 4077.39 | | 4113.48 | 86.97 |
| 4156.12 | | 4192.2 | | 4221.73 | | 4238.13 | | 4274.21 | 87.74 |
| 4300.45 | | 4310.29 | | 4379.18 | | 4431.66 | | 4477.59 | 87.93 |
| 4500.55 | | 4536.63 | | 4556.32 | | 4595.68 | | 4635.05 | 87.94 |
| 4674.42 | | 4694.1 | | 4736.75 | | 4746.59 | | 4799.08 | 88.01 |
| 4825.33 | | 4858.13 | 87.9 | 4881.1 | | 4927.03 | | 4959.83 | 87.49 |
| 4969.67 | | 5038.57 | 87.21 | 5100.9 | | 5153.39 | | 5163.23 | 87.2 |
| 5215.72 | | 5245.24 | | 5287.89 | | 5297.73 | 87.05 | 5337.1 | 86.81 |
| 5360.07 | | 5405.99 | 86.72 | 5422.4 | 86.94 | 5455.2 | | 5474.89 | 86.97 |
| 5524.1 | | 5550.34 | | 5583.15 | | 5606.11 | | 5619.23 | 87.67 |
| 5632.36 | | 5648.76 | 87.92 | 5658.6 | | 5694.69 | | 5711.09 | 87.67 |
| 5740.62 | | 5753.74 | | 5796.39 | | 5865.28 | | 5976.82 | 88.09 |
| 5983.38 | | 6026.03 | | 6039.15 | | 6052.27 | | 6068.68 | 87.9 |
| 6114.6 | | 6127.73 | | 6157.25 | | 6242.55 | | 6252.39 | 88.38 |
| 6288.48 | | 6422.98 | | 6465.63 | | 6511.56 | | 6550.93 | 88.61 |
| 6603.42 | | 6646.06 | | 6764.17 | | 6790.41 | | 6816.65 | 88.76 |
| 6865.86 | | 6892.11 | | 6938.04 | | 6990.53 | | 6993.81 | 89.8 |
| 7000.37 | | 7052.86 | 89.09 | 7079.1 | | 7115.19 | | 7157.84 | 89.28 |
| 7269.38 | | 7295.62 | | 7410.44 | | 7472.78 | | 7535.11 | 89.4 |
| 7630.24 | | 7731.94 | 89.61 | 7807.4 | | 7813.96 | | 7899.25 | 89.7 |
| 7941.9 | | 7951.74 | | 8046.88 | | 8069.85 | | 8082.97 | 89.49 |
| 8096.09 | | 8102.65 | | 8125.62 | 88.4 | 8145.3 | | 8158.42 | 91.8 |
| | | 8187.95 | | 8220.76 | 90.24 | | | | 90.53 |
| 8171.54
8450.42 | | 8466.83 | | 8601.35 | | 8299.5
8650.56 | 90.56 | 8384.8
8739.15 | 90.53 |
| | | | | | | | | | |
| 8771.95 | | 8808.04 | | 8844.13 | 90.67 | 8850.7 | | 8860.54 | 91.28 |
| 8893.35 | | 8919.6 | | 8949.12 | | 8972.09 | | 8991.78 | 91.6 |
| 9011.46 | | 9040.99 | | 9063.96 | | 9093.49 | | 9129.58 | 91.64 |
| 9145.98 | | 9159.11 | | 9175.51 | | 9198.48 | | 9260.81 | 90.76 |
| 9280.5 | | 9319.87 | 90.9 | 9333 | | 9339.56 | | 9342.84 | 90.53 |
| 9349.4 | | 9352.68 | | 9392.05 | | 9421.58 | | 9490.48 | 90.65 |
| 9513.45 | | 9549.54 | | 9628.28 | | 9661.09 | | 9690.62 | 90.54 |
| 9825.14 | 90.35 | 9854.66 | 90.38 | 9939.97 | 90.111 | 10018.71 | 90.13 | 10038.4 | 90.01 |

90.2410333.68

90.110281.19

```
10369.77
10550.22
               90.3210379.61
                                     90.1510428.83
                                                           90.3510461.64
                                                                                 90.2810481.32
                                                                                                       90.49
91.59
               90.5910710.99
10704.43
                                     91.6810714.27
                                                           90.7810740.52
                                                                                 90.9710773.33
                                                                                                       90.66
                                                                                90.810809.42
88.1910865.19
10776.61
                91.410783.17
                                     89.9910786.45
                                                           91.1410796.29
10815.98
               91.8310825.82
                                     91.6510835.66
                                                           89.0510852.07
               88.6 10898
88.9311127.67
                                    88.83 10966.9
88.8211196.57
                                                          88.7511042.36
89.0211239.22
                                                                                88.8111062.05
88.8611265.47
10884.88
 11104.7
                                                                                                       88.98
 11311.4
               88.92 11327.8
                                     89.0611373.74
                                                          88.8611432.79
                                                                                 89.07 11465.6
               89.8911495.13
                                      92.311514.82
               88.711570.59
89.211790.42
89.63 11931.5
                                    88.9711629.65
8911813.38
88.8911938.06
                                                          88.9111649.34
89.2411823.23
89.52 11947.9
                                                                                89.1211711.67
89.0411892.13
11547.63
                                                                                                       89.07
11924.94
                                                                                 88.6611957.75
                                                                                                       88.65
               89.9811964.31
89.0812128.35
                                                                                89.08 12016.8
88.9812239.91
11961.03
                                     88.9711980.71
                                                          88.6811993.84
12105.39
                                     88.9512184.13
                                                          89.1712210.38
                                                                                                        89.2
12259.59
               89.0312312.09
                                     89.2312331.77
                                                          89.0312390.83
                                                                                  89.212407.23
               89.1812492.54
                                                           89.2412610.65
                                                                                89.1112676.27
                                    89.3412817.35
88.8113004.36
                                                          89.06 12843.6
89.0113020.77
12738.61
               89.1912761.58
                                                                                  89.212866.57
                                                                                                       88.96
                                                                                 88.8713056.86
13089.67
               88.8313148.73
                                     88.93 13204.5
                                                          88.8813240.59
                                                                                 88.9913283.24
                                                                                                       88.75
               88.913329.18
87.9913401.36
                                    88.7713355.42
89.1113417.76
                                                          89.0613378.39
92.4113430.89
                                                                                 89.6313384.95
93.3613437.45
13391.52
                                                                                                       93.18
               91.5513493.22
91.01 13634.3
                                     91.213499.79
91.2313673.68
                                                          91.4313512.91
91.2113683.52
                                                                                 90.8913555.56
90.9513709.77
13460.42
                                                                                                       91.08
13624.46
               90.7313752.42
90.4413867.25
                                    90.6713762.26
91.3313873.81
13729.45
                                                          90.3113788.51
                                                                                 90.1513847.57
                                                                                                       90.78
13926.31
               89.6313942.71
                                     90.2213952.56
                                                          89.39 13962.4
                                                                                  89.513972.24
                                                                                                       87.88
13985.37
               87.7113995.21
97.1214083.79
                                     89.8714008.33
                                                          90.3714028.02
94.0414103.48
                                                                                94.7314044.42
93.1714205.19
                                                                                                       97.23
                                     98.2914096.92
14050.98
14208 47
               93 2914218 31
                                     97 4814224 87
                                                           97 8514241 28
                                                                                 97.12 14254.4
14260.96
              95.5914274.09
                                    94.5514280.65
                                                          93.34
                          Sta
                                                                                                      n Val
      Sta n Val Sta
0 .183 2998.18
                                  n Val Sta
.066 3562.39
                                                         n Val Sta
.015 3732.96
                                                                                n Val Sta
.066 3867.45
                    Right Lengths: Left Channel Right 3772.33 3623.66 4885.99 2026.76 Station= 105.99 Elevation= 103.12 Station=14083.79 Elevation= 98.29
Bank Sta: Left Right 3513.18 3772.33
                                                                                  Coeff Contr.
                                                                                                       Expan.
Left Levee
| Sta L | Sta R | Elev | Sta L | Sta R | 27.04 | 3506.48 | 89.46 | 3876.06 | 8410.14
                                                          89.59
CROSS SECTION OUTPUT Profile #Design Flow
                                        99.05
                                                                                                      Channel
                                                                                                                    Right OB
                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                                                                      0.144
3623.66
   Vel Head (ft)
                                        0.05
                                                                                                        0.037
                                                                                                                       0.068
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                     4885.99
8057.99
                                                                                                                    2026.76
                                        92.32
                                                                                     32029.69
                                                                                                                   95671.73
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                    Area (sq ft)
Flow (cfs)
                                                                                    32029.69
13537.82
                                                                                                     8057.99
                                  0.000083
                                                                                                                   95671.73
                                   125000.00
                                                                                                     28195.32
                                                                                                                    83266.86
                                                   Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
  Top Width (ft)
Vel Total (ft/s)
                                   14141.88
                                                                                      3374 41
                                                                                                      259.15
                                                                                                                   10508 32
                                                                                          0.42
                                        39.74
  Max Chl Doth (ft)
                                                                                                        31.09
                                                                                                                         9.10
  Conv. Total (cfs)
Length Wtd. (ft)
                                   13700240.0
                                                                                        1483771.0
                                                                                                        3090262.0
                                                                                                                  10522.92
                                    3016.35
                                                                                      3375.71
                                                                                                      271.22
        Ch El (ft)
                                        59.26
                                                    Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                          0.05
                                                                                                         0.15
                                         3.88
  Alpha
  Frctn Loss (ft)
C & E Loss (ft)
                                                   Cum Volume (acre-ft)
Cum SA (acres)
                                                                                    46096.51
8872.37
                                         0 26
                                                                                                    28895.08
                                                                                                                   79919 94
                                                                                                     1386.52
Warning: The cross-section end points had to be extended vertically for the computed water surface.
            Manning's n values were composited to a single value in the main channel
Note:
```

Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RTVER: Rio Grande

RS: 140 REACH: Lower Reach

9010163.07

Description: RGV-01, Updated on left with new survey to Station 1127.85. Bathymetric elevations translated from IBWC 2008 Cross-sections. Section along left levee updated with 2017 survey

432 Station Elevation Data num= Elev 90.73 Sta 36.99 Elev 91.04 Sta 73.99 Sta 0 Elev Sta Elev 102.21 120.98 101.02 93.07 101.98 162.98 346.96 529.93 655.92 87.08 90.58 186.97 380.95 85.85 205.97 88.03 410.95 217.97 449.94 88.15 90.89 241.97 90.51 87.88 465.94 90 87.03 625.92 86.15 598.93 87.88 759.9 89 3 552.93 86.72 568.93 89 11 89.56 83.43 89.33 713.91 83.23 1018.87 87.49 83.6 1060.86 84.6 1127.85 792.9 896.88 84.91 1144.48 86.54 1190.39 87.08 1288.77 86.77 1193.67 87.41 1315.01 87.15 1219.9 87.97 1324.84 87.06 1226.46 87.44 1347.8 1242.86 87.26 1364.2 88.09 1370.75 87.73 1551.12 87.7 1406.83 88.24 1560.96 88.05 1439.62 88.59 1597.03 87.95 1482.25 88.1 88.46 1603.59 1626.54 1741.32 88.53 1675.73 88.81 1774.11 88.92 1692.13 89.26 1797.07 89.14 1734.76 89.2 1842.98 88.8 1715.08 89 16 89.38 1823.3 89.39 1934.8 88.86 1915.12 89.46 1951.2 89.73 2029.9 90.26 2141.4 1882.33 89.18 1898.73 90.01 89.67 1977.43 90.22 2065.97 90.2 1997.11 90.59 2075.81 90.2 2010.22 90.14 2118.44 1964.31 2036.46 89.31 88.18 2226.66 86.82 2348 87.39 2459.5 2151.24 88.16 2180.75 86.92 2285.69 87.6 2203.71 86.86 2308.65 86.61 2233.22 87.18 2357.84 2266.02 2380.79 88.3 2407.03 88.49 2439.82 88.95 2482.45 88.27 87 2515.25 86.63 2534.93 85.6 2597.23 84.73 2623.47 2498.85 2643.15 85.78 2692.34 87.16 2721.85 87 2757.92 87.39 2764.48 86.98 2780.88 86.9 2810.39 86.96 2951.41 87.25 2813.67 87.24 2964.53 86.96 2846.47 87.08 3017 86.92 2856.31 87.11 3026.83 2902.22 86.91 3161.29 86.63 3318.7 3072.75 3246.55 86.75 3112.1 86.37 3292.46 86.47 3128.49 86.33 3302.3 86.54 3190.8 86.43 3348.21 86.51 3433.48 86.94 3525.3 88.28 3663.04 86.96 3443.32 87.27 3541.7 86.54 3462.99 87.21 3564.65 3361.33 86.99 3403.96 88.48 3669.59 88.88 3840.12 3594 17 88 3610 57 88.14 3708.95 88 43 89.16 3925.39 88.65 3905.71 89.72 3941.78 3876.2 89.51 3951.62 89.01 3964.74 89.49 3984.42 92.36 4056.56 91.36 4000.81 90.9 4063.12 92.09 4013.93 88.24 4076.24 91.71 4040.17 85.4 4095.92 4050 4112.31 87.76 4128.71 87.62 4154.94 87.96 4177.9 87.84 4197.57

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88.67 4368.1
86.2 4509.11
86 4632.53
               90.55 4328.75
88.37 4476.32
                                                                                       87.98 4433.69
                                       87.44 4492.71
86.23 4609.8
88.84 4723.44
                                                                                      86.43 4538.37
86.09 4658.5
89.4 4759.16
 4450.08
                                                                                                              86.09
                87.89 4700.72
                                                               89.01 4733.19
 4687.73
                                                                                                              89.01
  4768.9
                88.31 4778.64
                                       88.54 4794.88
                                                               86.23 4807.87
                                                                                       85.73 4817.61
                                       83.46 4889.71
 4856.92
                84.87 4879.87
                                                               83.51 4909.38
                                                                                      82.82 4925.77
                                                                                                              82.84
               83.23 4952
83.07 5033.96
                                       86 4974.95
86.14 5060.19
                                                              86.91 5001.18
86.74 5070.03
                                                                                      83.43 5014.29
87.73 5089.7
 4932.33
 5020.85
                                                                                                              85.76
 5096.26
               86.02 5102.81
80.71 5145.44
                                       85.23 5115.93
                                                               80.77 5122.48
                                                                                       79.28 5129.04
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                                                               78.71 5217.56
73.62 5266.74
72.27 5319.2
 5184.78
                77.06 5197.89
                                       77.23 5204.45
                                                                                       76.38 5230.68
                                                                                                               75.2
               77.06 5197.89
76.53 5250.35
71.65 5309.36
69.27 5342.15
56.3 5451.99
                                       74.71 5260.19
72.74 5312.64
                                                                                       72.03 5283.14
                                                                                      69.45 5325.76
57.8 5431.99
55.4 5505.99
 5299.53
                                                                                                              68.45
                                                               65.87 5395.99
                                                                                                               56.3
 5335.59
                                       68.35 5351.99
 5441.99
                                        55.6 5460.99
                                                                56.1 5480.99
                                                                                                               55.9
 5520.99
                 55.2 5532.99
                                         55.1 5535.59
                                                              65.87 5542.15
88.16 5578.21
                                                                                      67.89 5548.7
89.2 5647.06
               78.71 5565.1
89.06 5706.08
88.36 5971.82
 5558.54
                                       83.09 5574.93
                                       89.14 5758.57
88.55 6007.9
90.7 6086.64
                                                              88.8 5771.69
88.38 6037.43
89.28 6099.76
                                                                                      88.95 5840.59
88.05 6053.83
 5663.45
                                                                                                              88.68
 5952.13
6070.24
                91.58 6080.08
                                                                                      88.61 6126.01
                                                                                                              88.69
               88.37 6204.75
88.32 6385.19
                                       88.33 6230.99
88.52 6421.27
                                                              88.54 6240.83
88.37 6460.64
                                                                                      88.32 6286.76
88.62 6486.89
 6135.85
 6375.34
 6532.82
6785.43
               88.52 6585.31
88.45 6818.24
                                       88.38 6618.12
88.75 6837.92
                                                               88.51 6693.57
88.63 6870.73
                                                                                      88.53 6716.54
88.87 6883.85
               89.01 6975.71
89.58 7054.45
89.29 7228.33
                                       88.92 6995.4
89.41 7090.54
89.21 7287.38
 6949.47
                                                               89.53 7008.52
                                                                                      90.32 7015.08
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                                                              89.53 7008.52
89.9 7133.19
89.04 7359.56
88.41 7585.93
88.16 7887.75
                                                                                      89.8 7143.03
89.01 7408.77
 7162.72
                                                                                                              88.81
 7454.7
7749.96
               88.96 7530.16
88.4 7812.3
                                       88.66 7540
88.12 7877.91
                                                                                      88.68 7631.86
88.01 7943.52
               87.92 8074.75
88.01 8209.26
                                                               87.93 8117.4
 7966 49
                                       88.01 8107.56
                                                                                       88.1 8140.37
                                                                                                              87 86
                                       87.97 8222.38
                                                               87.16 8261.75
 8153.49
                                                                                      87.02 8297.83
                                                                                                              87.28
               87.09 8376.55
87.36 8671.78
87.34 8806.27
                                                              87.15 8425.76
87.39 8727.54
                                       87.22 8402.8
87.25 8698.02
                                                                                      87.36 8494.64
87.21 8760.35
 8333.91
                                                                                                              87.15
                                                              87.34 8885
87.62 9085.09
87.1 9170.38
88.86 9268.79
90.08 9396.72
                                       87.55 8832.51
                                                                                       87.5 8894.84
 8786.59
                                                                                                              87.74
                                       87.55 8832.51
87.65 9052.29
87.49 9160.54
88.72 9245.83
89.8 9344.24
90.02 9531.21
               87.5 8960.44
88.25 9137.58
                                                                                      87.91 9117.9
87.38 9190.06
 9131.02
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                                                                                      90.31 9281.91
90.15 9406.56
90.19 9583.7
               87.55 9235.99
89.79 9337.67
 9213 02
                                                                                                              90 61
 9459.04
                89.73 9482.01
                                                               89.94 9567.29
                                                                                                              89.88
                                       89.94 9728.03
                                       9010105.26
89.8210279.11
               89.9510062.62
90.0410239.75
                                                                                      89.9710170.86
90.0610374.24
 9944.53
                                                               89.8110144.62
                                                                                                              89.85
                                                              89.8610292.23
90.3310482.49
10443.13
                89.9910466.09
                                       89.8510475.93
                                                                                      89.6110489.05
                                                                                                              90.41
                                                              89.910787.56
89.7711004.05
89.2811335.36
89.4611522.34
                                       89.6910712.11
89.7910941.73
89.4911305.84
               89.8210639.94
89.5510885.96
                                                                                      89.6710810.52
89.5711076.22
10495 61
10840.04
                                                                                      89.53 11361.6
89.2811535.46
11161.51
                89.64 11279.6
                                                                                                              89.37
                89.4111482.97
                                       89.2511496.09
                                       88.1211617.46
89.1511732.27
11555.14
               88.9811571.54
                                                              88.5211637.15
                                                                                      88.1111669.95
                                                                                                              88.16
11706.03
               89.5511896.29
                                       89.5611909.41
                                                              89.3311952.05
11860.21
                                                                                      90.4211978.29
                                                                                                              89.99
                                       93.0212017.66
94.4812086.54
                                                              96.0212037.34
93.1712194.79
                                                                                      9812050.46
93.1712204.63
 11994.7
               90.5812001.26
                                                                                                              97.74
               98.0712079.98
97.8912230.88
12073.42
12214 47
                                       97 5212240 72
                                                              96 59 12260 4
                                                                                      98 4812266 96
                                                                                                              96 88
12270.24
               95.0112280.08
                             Sta n Val Sta
73.99 .12 5070.03
                                                             n Val
                                                                                      n Val
     Sta n Val Sta
0 .066 73.99
                                                                             Sta
                                                                                                     Sta
                                                                                                              n Val
                                                                  .07 5342.15
                                                                                        .025 5548.7
 5574.93
                .066
Bank Sta: Left Right 5070.03 5574.93
                                                                                       Coeff Contr.
                                     Lengths: Left Channel
                                                                         Right
                                                                                                              Expan.
                                                              1010 1431.32
                                      1951.2
1
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
                                    T
101.98
          0 5070.03 87.73
Left Levee
                  Station= 101.98
Station=12037.34
                                                       Elevation= 102.21
Right Levee
                                                       Elevation=
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                                       Element
                                                                                             Left OB
                                                                                                             Channel
                                                                                                                            Right OB
                                                      Element
Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
                                                                                               0.120
                                                                                                                             0.066
1431.32
                                                                                            1951.20
                                                                                                            1010.00
  W.S. Elev (ft)
Crit W.S. (ft)
                                         98.75
                                          80 89
                                                                                          51108.70
                                                                                                          14558.94
                                                                                                                           64266 66
                              0.000090
125000.0
  E.G. Slope (ft/ft)
                                                                                          55240.17
                                                                                                          14558.94
                                                                                                                           64266.66
  O Total (cfs)
                                     125000 00
                                                        Flow (cfs)
                                                                                            28394 81
                                                                                                            34910 91
                                                                                                                            61694 28
  Top Width (ft)
Vel Total (ft/s)
                                                       Top Width (ft)
                                                       Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
                                           0.96
                                                                                                0.56
                                                                                                                 2.40
                                                                                                                                 0.96
                                                                                            10.34
3001152.0
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                     43.65
13211710.0
                                                                                                               28.84
                                                                                                               3689862.0
                                                                                                                                 6520693.0
                                                       Wetted Per. (ft)
                                      1385.25
                                                                                            4949.10
                                                                                                              525.00
                                                                                                                            6717.40
  Min Ch El (ft)
                                                       Shear (lb/sq ft)
                                                                                            0.06
                                                                                                              0.15
                                         55.10
                                                                                                                                 0.05
                                                       Stream Power (lb/ft s)
Cum Volume (acre-ft)
  Alpha
                                           2.30
                                                                                                0.03
                                                                                                                 0.37
                                                                                                                                 0.05
   Frctn Loss (ft)
  C & E Loss (ft)
                                           0.01
                                                       Cum SA (acres)
                                                                                            8526.45
                                                                                                            1343.67
                                                                                                                           10426.24
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
            1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.
            Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                  RS: 139.85
REACH: Lower Reach
Description: RGV-01, Updated on left with new survey to Station 1127.46.
                  Bathymetric elevations translated from IBWC 2008 Cross-sections,
Section along left levee updated with 2017 survey
Station Elevation Data
Sta Elev Sta
0 90.81 44.74
                                     num=
                                                 438
                                                      Sta
                                                                                                87.55
197.54
                                       90.62
89.66
                                                   56.66
                                                                91.4
                                                                        69.59
171.54
                                                                                      95.11
                                                                                                           102.04
                         140.55
                                                157.54
275.53
                                                               85.23
                                                                                      89.96
82.94
83.17
               89.54
                                       89.99
  211.54
                                                              89.55
                                                                         323.53
                                                                                                366.53
                                                                                                              90.05
   383.53
               89.58
82.48
                         404.52
604.51
                                       84.45
82.27
                                                443.52
                                                              82.89
82.33
                                                                         461.52
761.49
                                                                                                486.52
804.49
   526.51
                                                   724.5
                                       84.42 1031.47
87.71 1220.2
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846.48

84.35

943.48

84.78 1085.46

84.47 1127.46

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88.67 1348.12
                                                                                                                89.39 1387.47
  1423.55
                     89.87 1433.39
                                                   90.53 1446.51
                                                                                   89.8 1472.75
                                                                                                               90.13 1489.15
89.08 1603.94
                                                                                                                                               89.7
                                                                                 89.42 1584.26
                    89.48 1626.9
89.42 1774.5
                                                                                 89.3 1708.9
89.67 1817.13
  1620.34
                                                   90.07
                                                               1643.3
                                                                                                                89.24 1738.42
                                                                                                                                              89.69
                     89.42
  1767.94
                                                   89.86 1800.73
                                                                                                                     89 1826.97
                     86.57 1879.45
  1853.21
                                                   87.41 1892.57
                                                                                 86.41 1912.25
                                                                                                                86.41 1945.05
                                                                                                                                              85.42
                     85.21 2007.36
83.3 2204.15
                                                   84.73 2013.92
82.97 2236.95
                                                                                 84.18 2063.12
82.9 2309.11
                                                                                                               85.06 2125.44
81.55 2345.19
  2161.52
                                                                                                                                              81.19
  2387.83
                     81.28 2404.23
                                                  80.99 2420.62
82.14 2541.98
                                                                                 81.25 2437.02
82.94 2597.74
                                                                                                                80.98 2482.94
                                                                                                                                              81.51
                                                                                                               83.45 2604.3
90.17 2742.05
                     82.02 2515.74
                                                   85.13 2712.53
                                                                                   88.5 2722.37
  2630.53
                     83.97 2673.17
                                                                                                                                              90.81
                    88.31 2758.45
81.79 2830.6
82.67 2869.96
                                                  84.92 2765.01
84.94 2837.16
                                                                                 83.08 2794.53
92.58 2840.44
                                                                                                                82.81 2801.09
93.29 2847
  2820.76
                                                                                                               93.29
                                                                                                                                              86.72
                                                                                                               81.35 2896.2
                                                  82.37 2879.8
92.88 2929
  2856.84
                                                                                 81.26 2886.36
  2906.04
                                                                                 93.35 2942.12
                                                                                                               92.81 2971.64
                                                                                                                                              93.61
                     92.16 2909.32
   2978.2
                    92.77 2984.76
90.74 3047.07
                                                  93.66 2991.32
89.41 3053.63
                                                                                 92.87 3004.44
89.48 3073.31
                                                                                                                 93.4 3017.56
                                                                                                                                              90.67
                                                                                                                88.06 3092.99
                    85.51 3122.51
88.95 3201.23
                                                                                 84.11 3171.71
89.58 3227.47
                                                                                                               84.23 3181.55
87.71 3234.03
  3106.11
                                                   85.39 3148.75
                                                                                                                                              85.66
                                                  88.35 3211.07
85.79 3293.06
   3191.39
  3243.86
                     86.41 3273.38
                                                                                 85.72
                                                                                             3368.5
                                                                                                                86.04 3440.66
                                                                                                                                              85.92
  3499.69
                                                  86.28 3545.61
86.26 3752.24
                                                                                 85.95 3575.13
87.23 3768.64
                                                                                                               86.38 3594.81
86.2 3811.28
                     85.94 3512.81
                          86 3745.68
                                                                                                                                              86.18
                    86.52 3919.51
86.68 4008.07
                                                  86.22 3949.03
86.22 4031.03
                                                                                 86.23 3955.59
86.36 4053.99
                                                                                                               86.87 3978.55
86.11 4073.66
   3824.4
   3998.23
                                                                                 86.08 4168.78
86.02 4345.9
85.88 4654.21
  4119.58
                     86.17 4132.7
                                                   86.42 4149.1
                                                                                                                86.28 4234.38
                                                                                                                                              86.05
                     86.04 4286.86
                                                                                                               86.34 4368.85
                                                  85.72 4611.57
85.82 4801.8
86.42 4952.68
                                                                                                               85.6 4703.4
85.63 4910.04
93.46 4962.52
  4496.77
                     85.93 4542.69
                                                                                                                                              85.81
  4719.8
4936.28
                    85.61 4769
85.64 4946.12
                                                                                 85.67 4893.64
89.09 4959.24
                                                                                                                                              94.05
                                                   90.8 5015
77.79 5126.52
  4972 36
                     93.37
                                4982.2
                                                                                 80 87 5028 11
                                                                                                                78.88 5067.47
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                                                                                                                79.98 5159.33
  5080.59
                       78.9
                                      5097
                                                                                 78.62 5146.21
                    76.47 5192.14
71.89 5257.75
77.47 5379.14
                                                  73.38 5201.98
73.7 5300.4
80.53 5385.7
                                                                                 73.01 5211.82
72.88 5323.37
                                                                                                               71.72 5238.07
73.39 5339.77
  5169.17
                                                                                                                                              71.25
                                                                                                                79.47 5402.11
   5369.3
                                                                                   81.2 5398.83
                                                                                                                                              79.85
  5411.95
5474.28
                    83.5 5428.35
82.47 5480.84
                                                   85.11 5448.04
82.12 5500.53
                                                                                 81.32 5457.88
75.74 5510.37
                                                                                                                78.65 5464.44
74.79 5513.65
                                                                                                                                               73.39
                                                                                 61.04 5570.77
61.04 5690.77
  5523 49
                     66.02 5530.77
                                                   64.84 5540.77
                                                                                                                59.64 5610.77
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                     59.84 5650.77
                                                   61.34 5670.77
                                                                                                                60.34 5694.09
  5700.66
                     66.34 5713.78
                                                   73.48 5720.34
                                                                                 78.93 5736.74
                                                                                                               85.39 5746.59
                                                                                                                                              89.86
                                                  88.67 5858.13
87.77 6100.91
                                                                                   88.3 5927.03
                                                                                 87.96 6133.72
87.1 6386.33
86.53 6615.99
  5995.92
                     88.32 6084.5
                                                                                                               87.69 6156.68
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                    87.28 6281.35
86.78 6560.21
                                                   87.1 6353.53
86.91 6593.02
                                                                                                               86.88 6422.42
86.74 6694.73
  6543.81
                                                                                                                                                   86
                    86.32 6750.5
85.7 6888.29
                                                  86.75 6776.75
85.31 6904.69
                                                                                 86.62 6806.27
85.66 6940.78
                                                                                                               85.86 6819.4
85.13 6967.03
  6737.38
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                                                   84.8 7068.73
84.95 7193.4
                                                                                                               85.13 7124.51
85.78 7232.77
  6999 84
                     85.32 7032.64
                                                                                 84.74 7085.14
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                                                  84.95 7193.4
84.77 7455.86
88.73 7573.97
                     85.35 7147.47
                                                                                 85.91 7209.81
                                                                                 85.43 7488.67
  7252.46
                     84.77 7436.18
                                                                                                               85.74 7524.76
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89.55 7669.11
88.38 7774.1
88.8 7957.82
                    87.87 7567.41
89.62 7626.46
                                                                                 89.41 7593.65
89.47 7649.43
                                                  90.84 7636.3
87.97 7744.57
87.76 7915.17
   7619.9
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                    89.06 7724.89
87.3 7885.64
                                                                                 87.98 7754.41
87.75 7934.85
  7695.36
  7826.59
                                                                                                               85.12 8026.72
86.69 8118.58
85.42 8305.58
  7964 38
                       88 6 7987 35
                                                     88.1 8007.03
                                                                                 88.16 8016.87
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                    87.91 8066.08
86.76 8164.51
                                                  87.04 8072.65
86.69 8213.72
                                                                                 87.47 8092.33
86.02 8239.97
  8141.54
                                                                                                                                              85.08
                     85.43 8476.19
                                                                                 86.16 8581.17
                                                                                                               86.79 8587.74
  8604.14
                     87.17 8640.23
                                                     87.9 8676.32
                                                                                 88.24 8709.13
                                                                                                                 89.4 8718.97
                                                                                                                                              89.18
                                                                                                               89.98 8909.26
89.06 9024.09
89.92 9135.64
91 9197.97
  8771 46
                    89.75 8830.52
89.98 8935.51
                                                   90.04 8866.61
89.63 8968.31
                                                                                 89.81 8896.14
89.78 9010.97
  8928.94
                                                                                                                                              89.67
                                                  89.76 9089.71
89.73 9171.73
  9033.93
                     89.37 9063.46
                                                                                 89 29 9112 67
                                                                                                                                              89 53
                     90.26 9158.6
                                                                                 92.12 9188.13
                          92 9230.78
                                                   90.65 9250.47
                                                                                                               89.08 9312.8
  9214.38
                                                                                 89.78 9299.68
                                                                                                                                               89.5
                    88.95 9375.14
89.13 9467
                                                  89.39 9388.26
88.57 9473.57
                                                                                 89.03 9398.11
89.7 9496.53
                                                                                                               89.42 9427.63
88.9 9526.06
  9460.44
                                                                                                                                               88.5
                                                                                                               88.42 9624.48
87.72 9831.18
87.75 9906.64
 9545.74
9647.45
                                                  88.18 9594.96
88.53 9703.22
                                                                                 88.69 9614.64
87.82 9778.68
                     88.56 9575.27
                     88.45 9690.1
                                                                                                                                              88.23
  9850.86
                     89.48 9867.27
                                                   88.55 9880.39
                                                                                 88.55 9896.79
                                                                                                                                              85 58
                     85.23 9926.32
                                                   88.58 9959.13
                                                                                 88.2510014.91
                                                                                                                88.4610041.15
   9913.2
10057.56
                    87.7810093.65
87.8110421.73
                                                   88.3710149.42
                                                                                 88.1610234.72
                                                                                                               88.0810316.74
                                                                                                                                              87.71
                                                  89.2910428.29
88.9710602.18
                                                                                 88.710441.42
89.5310631.71
                                                                                                                90.4410454.54
                     90.1410575.93
                                                                                                                87.8810671.08
10497.19
                                                                                                                                              87.45
                                                  87.4710831.84
86.0211084.46
                                                                                 87.210861.36
86.1111140.24
                                                                                                               87.2910926.98
85.7911179.61
10717.01
                     87.6110815.43
10959.79
                     86.6111051.65
                                                                                                                                              85.79
                    86.0111268.19
87.64 11386.3
                                                  85.9511330.53
86.411399.42
11205.85
                                                                                 86.3211353.49
                                                                                                                86.6811360.05
                                                                                                                                              86 39
                                                                                 86.4611409.27
                                                                                                                88.5511422.39
                                                  88.44 11524.1
87.5411619.24
91.2911675.02
11474 88
                     87.6511497.85
                                                                                 90 2211547 06
                                                                                                                90 8511573 31
                                                                                                                                              92 85
                                                                                 87.53 11625.8
91.63 11694.7
                     88.7211658.61
11648.77
                                                                                                                95.6411707.82
                                                                                                                                              96.64
                    96.6211747.19
97.3511894.83
                                                  97.1411757.04
96.8311914.52
                                                                                 93.1711868.58
96.8411921.08
 11724.23
                                                                                                                93.1711871.87
                                                                                                               93.4611930.92
11881.71
11940.76
                    90.7711947.33
                                                  92.0811960.45
                                                                                 92 32
Manning's n Values
                                                num=
                                                                               n Val Sta
.015 5700.66
                                      Sta n Val Sta
88.35 .066 5523.49
        Sta n Val Sta
0 .157 5428.35
                                                                                                                 .066 5746.59
                                                                                                                                               .074
Bank Sta: Left Right
                                                Lengths: Left Channel
                                                                                              Right
                                                                                                                 Coeff Contr.
                                                                                                                                              Expan.
5428.35 5746.59 1378.43 1433.33 1501.58
Left Levee Station= 87.55 Elevation= 102.04
Right Levee
                             Station=11747.19
                                                                       Elevation=
                                                                                               97 14
## Star | Star |
                                                                                  Elev
                                                                              90.82
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft.)
                                                       98.59
                                                                       Element
                                                                                                                        Left OB
                                                                                                                                             Channel
                                                                                                                                                                Right OB
    Vel Head (ft)
                                                                        Wt. n-Val.
                                                                                                                          0.157
                                                                                                                                               0.042
                                                                                                                                                                    0.074
                                                                       Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   W.S. Elev (ft)
Crit W.S. (ft)
                                                       98.46
                                                                                                                       1378.43
                                                                                                                                            1433.33
                                                                                                                                                                1501.58
   E.G. Slope (ft/ft)
                                                0.000211
                                                                                                                     30835.51
                                                                                                                                            9404.80
                                                                                                                                                               54173.53
                                                                       Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                125000.00
11844.61
                                                                                                                       13697.57
                                                                                                                                            44367.21
318.24
                                                                                                                                                                 66935.22
                                                                                                                                                                 6213.86
                                                       1.32
                                                                                                                            0.44
                                                                                                                                                4.72
                                                                                                                                                                     1.24
    Max Chl Dpth (ft)
   Conv. Total (cfs)
Length Wtd. (ft)
                                                 8595464 0
                                                                        Conv. (cfs)
Wetted Per. (ft)
                                                                                                                       941895 8
                                                                                                                                           3050855 0
                                                                                                                                                                   4602714 0
                                                                                                                                            333.48
                                                                                                                                              0.37
                                                                       Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
   Min Ch El (ft)
                                                      59.64
                                                                                                                            0.08
                                                                                                                                                                      0.11
   Alpha
Frctn Loss (ft)
                                                                                                                                                 1.76
                                                                                                                     40538.80
                                                        0.28
                                                                                                                                         27348.82
   C & E Loss (ft)
                                                                       Cum SA (acres)
                                                                                                                                           1334.12
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

| REACH: Lov | | RS: 13 | 9.57* | | | |
|----------------------|--------------------------------|----------------|----------------------|----------------------------------|--------------------------|------------------------|
| INPUT | | | | | | |
| | on: RGV-02,
Levation Data | num- | 432 | | | |
| Station El | Elev Sta | num=
Elev | | Elev Sta | Elev | Sta Elev |
| 120.05 | 91.11 36.98 | 92.45
87.6 | 46.83
149.36 | 93.49 72.37
86.71 166.58 | | 0.7 101.31 |
| 120.95
219.57 | 91.7 136.52
87.92 288.89 | 87.66 | 410.98 | 86.71 166.58
87.96 433.79 | 88.36 203
87.62 461 | |
| 514.29 | 82.9 538.44 | 83.03 | 571.98 | 82.59 625.64 | 82.61 723 | |
| 730.29
956.27 | 82.08 810.29
83.52 1025.78 | 82.12
83.83 | 834.95
1109.62 | 82.68 863.61
83.77 1133.23 | 82.68 891
83.6 1185 | |
| 1195.3 | 88.78 1217.18 | 88.99 | 1230.85 | 88.7 1258.19 | 89.39 1269 | .13 88.8 |
| 1304.66
1359.35 | 88.51 1310.13
88.39 1414.03 | | 1326.54
1438.64 | 88.67 1340.21
88.64 1463.25 | 88.52 1345
88.46 1468 | |
| 1490.58 | 88.63 1504.25 | 88.19 | 1512.46 | 87.35 1534.33 | 86.58 155 | 6.2 87.16 |
| 1567.14
1668.3 | 86.51 1583.55
85.07 1700.93 | | 1610.89
1733.68 | 85.83 1638.23
83.15 1744.59 | 85.76 1662
83.21 1760 | |
| 1766.42 | 85.18 1791.34 | 84.28 | 1815.54 | 83.88 1854.22 | 83.59 1914 | .37 82.77 |
| 1944.44
2154.97 | 82.55 1979.99
84.08 2160.44 | 82.65
84.52 | 2020.99 2182.3 | 82.44 2059.27
84.44 2217.85 | 82.81 2108
85.23 2250 | .49 83.73
.66 87.46 |
| 2258.86 | 88.58 2275.27 | 89.03 | 2283.47 | 87.37 2288.94 | 85.1 2294 | .41 83.87 |
| 2319.02
2362.75 | 83.66 2340.88
86.28 2370.96 | | 2349.08
2381.89 | 85.08 2354.55
83.46 2395.57 | 90.18 2357
82.78 2403 | |
| 2411.97 | 89.98 2414.7 | 90.46 | 2431.11 | 90.77 2442.05 | 90.41 2466 | .65 90.96 |
| 2472.12
2515.86 | 90.41 2477.59
89.08 2529.53 | 91.01
88.19 | 2483.06
2535 | 90.48 2494
88.23 2567.81 | 90.85 2504
86.06 2578 | |
| 2592.42 | 85.49 2614.29 | 84.63 | 2633.43 | 84.72 2641.64 | 85.68 2649 | .84 87.88 |
| 2658.04
2718.19 | 87.49 2666.24
85.82 2734.59 | | 2679.92
2797.48 | 87.08 2685.38
85.96 2836.02 | 87.16 2693
85.89 2906 | |
| 2917.78 | 86.24 2945.12 | 86.02 | 2969.73 | 86.32 2986.13 | 86 3037 | .93 86.02 |
| 3070.67
3177.52 | 85.81 3111.9
86.29 3245.29 | | 3117.36
3281.41 | 86.66 3131.04
86.08 3286.88 | 86 3166
86.51 3306 | |
| 3322.42 | 86.42 3330.62 | 86.11 | 3368.9 | 85.99 3385.3 | 86.22 3448 | .19 85.94 |
| 3464.59
3833.7 | 86.05 3576.7
85.76 3869.25 | | 3612.24
3910.25 | 86.16 3631.37
85.71 3923.92 | 85.97 3776
85 58 3964 | |
| 3992.28 | 85.59 4068.84 | 85.61 | 4082.51 | 85.9 4104.38 | 85.58 4112 | .59 86.08 |
| 4118.05
4180.93 | 87.85 4123.52
81 4213.74 | | 4134.46
4224.68 | 90.74 4142.66
81.01 4238.36 | 89.01 4
80.28 4262 | 170 82.35
.97 80.88 |
| 4279.38 | 81.78 4290.32 | | 4298.52 | 79.41 4317.67 | 77.32 4334 | |
| 4355.96
4440.73 | 75.91 4364.16
76.41 4465.35 | | 4372.36
4473.55 | 77.56 4407.91
82.2 4479.02 | 77.02 4427 | |
| 4500.9 | 85.95 4514.57 | 87.86 | | 87.44 4529.2 | 82.88 4489
84.79 455 | |
| 4560.69
4613.84 | 81.16 4572.08
77.1 4619.65 | | 4579.67 | 83.6 4590.82
70.91 4637.45 | 81.72 4602
69.41 4649 | |
| 4657.59 | 62.53 4668.01 | | 4683.74 | 60.07 4697.07 | 60.07 4735 | |
| 4754.74 | 60.4 4773.96 | | 4805.89 | 60.93 4812.4 | | .3264.82157 |
| 4821.91
4877.64 | 66 4834.51
88.37 4897.92 | | 4906.62 | 7.11629 4848.29
87.64 4926.91 | 81.21 4866
89.11 4947 | |
| 4961.69 | 87.97 4990.66 | | 5058.67 | 87.72 5086.68 | | |
| 5226.77
5513.97 | 87.29 5244.29
86.9 5548.98 | | 5279.32
5587.51 | 87.25 5303.83
86.85 5714.66 | 87.29 5432
86.72 5735 | |
| 5769.63 | 86.6 5804.91
86.69 5997.28 | 86.7
86.17 | 5878.21 | 86.27 5923.74
86.38 6021.8 | 86.5 5937
86.09 6084 | |
| 5965.77
6102.35 | 86.07 6140.87 | | 6011.3
6171.69 | 85.9 6203.92 | 85.84 6238 | |
| 6282.32 | 85.45 6291.05 | | 6337.01 | 85.7 6347.51 | 85.9 6361 | |
| 6407.5
6669.72 | 86.32 6428.07
85.62 6690.73 | | 6448.25
6725.76 | 85.72 6473.6
86.31 6764.29 | 85.62 6611
87.37 6771 | |
| 6809.82 | 88.29 6816.82 | | 6837.83 | 88.94 6855.35 | 88.7 6865 | |
| 6872.85
6977.93 | 89.75 6883.36
87.86 7007.16 | | 6897.37
7030.46 | 88.92 6918.38
87.62 7086.5 | 88.38 694
87.39 7152 | |
| 7178.92 | 87.64 7202.07 | | 7226.59 | 88.15 7233.59 | 88.36 7258 | |
| 7279.12
7349.17 | 88.08 7289.62
87.63 7370.18 | 87.12 | 7300.14
7398.2 | 86.02 7317.65
86.97 7422.71 | 87.88 7341
87.16 7447 | |
| 7499.77
7843 | 86.7 7527.79
86.81 7892.03 | | | 86.08 7646.86 | 86.38 7779 | .96 86.48 |
| 7996.91 | 88.25 8028.63 | | 7899.04
8039.13 | 88.83 8095.17 | 87.51 7955
89.23 8158 | |
| 8196.74 | 89.3 8228.27
89.26 8350.85 | 89.4 | 8242.27 | 89.2 8263.28 | 89.41 8270 | |
| 8305.31
8434.91 | 88.97 8459.42 | | 8364.86
8480.15 | 89.18 8375.36
89.36 8483.06 | 88.99 8406
89 8494 | |
| 8508.45 | 89.24 8522.47 | 90.84 | 8539.97 | 90.09 8550.48 | 90.65 8 | |
| 8585.5
8739.61 | 89.86 8619.88
89.05 8753.62 | | 8659.05
8764.13 | 88.87 8673.06
89.07 8795.64 | 89.14 8715
88.64 8830 | |
| 8837.67 | 88.56 8844.69 | 89.33 | 8869.2 | 88.76 8900.72 | 88.52 8921
88.66 9030 | |
| 8953.25
9075.84 | 88.32 8977.94
88.53 9089.84 | | 8995.28
9135.13 | 88.45 9005.79
88.02 9170.06 | 87.75 9175 | |
| 9196.26 | 88.06 9202.08
88.76 9296.48 | 88.34
88.24 | 9226.44 | 88.58 9247.45 | 89.38 9264 | |
| 9278.98
9363.03 | 88.48 9422.58 | | 9307
9450.59 | 86.78 9314
88.44 9468.11 | 86.52 9328
88.06 9506 | |
| 9566.17 | 88.24 9632.92 | 88.25 | | 88.14 9744.79
89.55 9897.82 | 87.85 9786 | |
| 9856.87
10021.48 | 88.81 9863.87
88.43 10049.5 | | 9877.89
10081.03 | 87.6710123.06 | 89.19 9937
87.3610191 | |
| 10218.04 | 87.2610232.59 | | 10270.43 | 87.5210294.67 | 87.1610398 | |
| 10418.9
10698.36 | 86.4410526.61
85.7810760.49 | | 10564.35
10827.04 | 85.9510613.94
85.8710851.55 | 85.7110665
86.1210858 | |
| 10879.57 | 86.7110886.57 | 85.86 | 10900.58 | 85.910911.09 | 87.3 1092 | 5.1 86.38 |
| 10981.13
11093.21 | 86.6211005.65
89.411107.22 | | 11033.68
11135.24 | 88.2911058.19
86.4811142.24 | 88.6511086
86.9711152 | |
| 11166.76 | 87.2511177.27 | 88.97 | 11194.79 | 89.29 11210.7 | 92.0511219 | .43 92.13 |
| 11233.99
11298.74 | 93.0711242.72
91.211387.52 | | 11251.46
11398.29 | 95.9511271.83
93.7711411.83 | 96.7311290
93.7311422 | .67 92.05
.88 95.95 |
| 11444.03 | 92.811459.72 | 93.06 | 11467.08 | 91.0811478.13 | 90.8911489 | .18 89 |
| 11496.56 | 89.8511511.29 | 90.18 | | | | |
| Manning's | | num= | 5
S+a | n Wal - C+- | n Wal | C+n n 17-7 |
| Sta
0 | n Val Sta
.157 4514.57 | n Val
.066 | Sta
4619.65 | n Val Sta
.015 4815.32 | n Val
.066 4841 | Sta n Val
.34 .074 |
| Bank Sta: | Left Right | Length | s: Left Cl | hannel Right | Coeff Con | tr. Expan. |
| | 14.57 4866.05 | | 1378.43 1 | 433.33 1501.58
vation= 101.94 | | 1 .3 |
| Right Leve | ee Station=1 | 11271.83 | Elev | vation= 101.94
vation= 96.73 | | |
| Blocked Ob | ostructions | num= | 2 | | | |

Sta L Sta R Elev 0 4123.52 90.75 4860.5811270.22

CROSS SECTION

RIVER: Rio Grande RS: 139.29* REACH: Lower Reach Description: RGV-02. Station Elevation Data Elev Sta Sta Elev Sta Elev 10.89 37.01 148.78 95.58 91.61 57.18 172.88 101.83 80.51 201.15 91.4 91.87 100.1 86.83 115.51 89.96 127.17 88.92 215.27 86.05 85.66 266.81 519.39 85.64 83.87 306.7 85.8 82.86 412.25 85.71 443 772.14 991.38 1243.7 1348.8 82.25 896.07 83.01 1082.36 81.92 82.77 847.77 936.73 82.59 969.07 82.61 82.97 82.95 1223.96 85.97 1254.84 86.65 1276.72 86.24 1305.11 86.33 1322.68 86.29 82.74 1375 85.99 1440.52 81.46 1383.74 84.69 1471.1 81.68 84.29 1388.1 1497.3 82.59 1396.84 84.07 1549.72 1366.26 1401.21 83.9 84.52 1572.15 1716.58 84.02 1604.97 84.94 1734.08 83.91 1663.28 84.91 1762.53 84.33 1675 85.32 1788.79 1712.2 86.42 1795.36 87.24 1815.05 85.22 1871.94 86.43 1823.81 87.78 1874.13 1808.49 84.66 1843.5 84.51 1861 84.15 88.02 1878.51 87.8 1933.22 85.85 1885.07 1904.77 84.21 1911.34 85.42 1917.9 88.18 1941.97 88 88.05 1983.55 85.88 2062.33 1961.67 2016.37 88.32 1966.05 86.99 2042.64 88.3 1992.31 85.59 2079.84 87.4 2001.05 85.15 2095.16 86.63 2121.42 85.82 2313.99 2101.72 85.71 2108.29 86.82 2114.85 87 05 2143 3 86 03 85.88 2257.31 2176.12 85.83 2226.46 86.08 2322.74 86.1 2364.32 85.63 2478.11 86.25 2377.45 85.75 2482.49 86.15 2397.07 86.09 2493.43 86.29 2418.91 85.79 2532.47 2344.62 86.11 85.93 2618.17 85.77 2790.17 85.8 2969.25 85.99 2683.82 2584.88 85.85 2613.79 86.15 2633.48 85.87 85.77 2878.58 85.73 3055.84 85.97 2768.33 85.91 2820.74 85.72 2938.68 3004.2 2921.21 85.68 85.64 85.63 3191.86 88.04 3296.56 82.77 3412.55 3084.29 3279.05 85.52 3161.4 85.74 3287.8 85.49 3254.98 85.73 3272.49 83.82 3333.75 88.1 3325.01 83.27 3427.87 3360.02 83.21 3379.72 83.57 3421.31 82.35 81.27 3456.33 80.69 3473.84 80.58 3486.97 80.81 3561.4 .12216 3600.8 82.42 3572.34 90.6 3612.42 84.56 3583.29 90.2 3618.26 3530.75 81.23 3541.7 85.8 3589.85 88.41 3596.4190.12216 83.87 3656.94 83.78 3669.88 86.18 3641.59 85.21 3621.17 3678.5 85.08 84.43 3708.67 74.97 3758.25 80.65 3715.8179.61821 3717.32 68.21 3767 64.37 3778.85 79.4 3726.17 61.85 3787.78 3691.17 3740.75 60.51 3823.38 61.29 3937.09 60.51 3844.26 60.97 3897.15 3796.71 60.87 3878.7 61.47 65.67 3951.41 3927.79 64.51 3943.15 68.05 3954.83 88.48 3991.67 87.72 4044.05 87.52 4118 88.19 3997.83 3968.46 80.42 3985.5 86.83 4019.4 85.99 80.42 3985.5 86.36 4037.89 87.26 4087.19 87 4352.32 86.72 4516.36 89.02 4050.21 87.11 4188.87 86.76 4482.32 86.65 4652.56 4071.78 87.14 4161.14 87.01 86.74 4387.67 86.88 4547.32 4268.5 4494.7 86.88 4442.08 86.72 4587.56 4689 7 86 64 4717 56 86.71 4825.89 86 64 4856 85 86 74 4887 8 86 65 86.91 4937.32 86.63 5124.99 86.65 4983.75 86.86 5154.78 86.76 4996.13 86.76 5188.29 86.47 5203.19 5104.46 86.61 86.36 5300 86.21 5478.98 86.44 5408 86.7 5500.64 86.48 5340.97 86.32 5373.74 5429.45 86.17 5491.36 86.05 5494.46 86.31 86.35 5608.97 86.49 5624.45 86.47 5943.25 86.78 5673.98 86.88 5949.44 86.48 5773.01 86.69 6033.01 5841.11 86.55 5903.27 87.82 88.24 6119.25 88.08 6230.97 6052 22 87.84 6082 88.24 6100.63 88.12 6111.8 88 67 87.99 6197.45 87.76 6265.15 88.23 6145.32 88.29 6167.65 87.79 6255.86 87.76 6320.86 87.91 6460.15 88.56 6271.34 87.77 6444.67 87.99 6502.8 6249.67 88.11 6262.05 87.83 87.51 6392.05 87.74 6472.52 87.6 6416.81 88.11 6495.35 6453.96 88.11 87.91 6460.15 88.01 6562.38 87.78 6648.03 87.56 6815.61 87.3 7048.22 87.42 7150.75 87.85 7302.03 88.73 7450.6 6551.21 6625.69 86.98 6573.56 87.55 6677.82 86.94 6592.17 87.49 6704.66 87.85 6618 87.57 6717.04 87.43 87.2 6890.08 87.39 7100.84 87.08 6942.21 87.41 7107.03 87.33 6980.13 86.96 7110.13 6741.8 87 38 7023.47 87.62 7212.27 88.57 7376.31 88.82 7575.28 7116.32 87.47 7172.04 87.64 7193.7 87.93 88.23 7314.41 88.69 7485.91 88.16 7348.13 88.84 7560.39 7428.93 88.7 7597.62 7705.62 88.67 7642.31 88.62 7750.31 88.74 7679.64 88.79 7780.1 88.61 7690.73 88.65 7828.21 88.83 7617.73 88.69 7716.79 88.79 89.13 88.45 7837.49 89.46 7921.61 89.34 7858.3 89.52 7940.23 88.76 7877.73 89.07 7976.77 89.57 7891.81 88.73 8018.43 7831.31 88.7 8118.97 8033 32 88 77 8078 01 88.57 8104.08 88.56 8130.15 88 72 8200.9 8348.2 88.71 8208.35 88.5 8357.48 88.66 8372.95 88.61 8289.39 88.49 8241.86 88.48 8387.09 8555.57 88.62 8413.17 87.98 8561.76 88.54 8461.57 87.77 8567.95 88.53 8476.47 88.68 8589.62 88.31 8524.62 88.17 8595.81 88.67 88.75 8644.05 88.86 8759.85 89.28 8696.18 88.71 8781.52 88.72 8707.36 88.79 8837.24 87.97 8714.8 88.73 8878.66 8611.29 87 82 8729.7 88.35 88.4 9081.75 87.97 9251.98 88.67 9335.55 88.26 9103.42 88.19 9264.37 8919 62 88 57 8982 92 88.31 9053 9 88 29 88.33 9299.46 88.09 9314.36 88.43 9377.66 9292.01 88.43 88.43 9377.66 88 9549.12 86.96 9691.5 86.8 9793.64 86.26 9889.59 88.13 9422.21 87.33 9595.55 88.21 9474.83 87.24 9648.16 87.86 9496.83 87.27 9676.02 9589.36 87.58 9716.26 87.42 9731.73 86.49 9824.59 87.55 9757.5 87.11 9787.45 86.43 9867.92 86.2 86.34 9846.26 85.73 10078.4 85.4410295.06 85.3210401.73 86.1310028.87 85.4410248.63 85.7610161.97 85.34 10349.6 85.4310186.72 85.5510357.05 9936.02 85 55 85.7710386.84 85.3410412.91 10379.4 86.0510427.81 85.55 10452.91 85.6110474.58 85.5110513.46 85.7610543.25 86.3610567.43 86.8610621.45 87.1710606.55 85.3710644.81 85.3410658.69 85.66 10669.87 10725.29 86.4710684.76 88.7310731.48 85.7810695.93 89.4410740.75 86.6610714.55 88.3610756.23 86.9510719.09 89.510765.52 95.3410817.37 89.3610933.78 10774.81 95.19 10781 95.7610796.47 96.3210805.43 90.92 89.3410826.33 89.2410921.84 10823.34 89.2410924.82 93.5 10936.76 94.3610951.79 94.1810960.64 94.9510964.04 94.5610972.58 92.54 88.7610996.47 87.2311062.13 88.7311004.91 89.2711013.09 11020.34 89.21 11037.6 Manning's n Values num= Sta n Val 0 .094 n Val Sta n Val Sta .015 3844.26 n Val Sta n Val Sta .094 3596.41 Lengths: Left Channel Right 1378.43 1433.33 1501.58 57.18 Elevation= 101.8 Bank Sta: Left Coeff Contr. Expan. 3600.8 3985.5 Station= Elevation= Elevation= 101.83

Station=10796.47

96.32

= 10/96 s num= Elev c

Right Levee

Blocked Obstructions Sta L Sta R E

172.12 3297.76 88.05 4048.1910767.64 89.44

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 139.01

INPUT

Description: RGV-02, Updated on left with new survey to Station 1301.82. Bathymetric elevations translated from IBWC 2008 Cross-sections num= Elev Station Elevation Data 433 Elev Sta Sta Sta 92.43 42 94.85 159.98 91.7 8 91.13 130.98 101.73 62.99 173.98 100.86 97.99 89.34 193.98 91.38 104.99 85.44 210.97 484.93 84.18 272.97 83.83 598.92 83.58 320.96 83.52 661.91 83.92 380.95 700.9 83.8 447.94 805.89 82.84 83.32 81.71 1007.86 82.14 1278.82 85.49 1376.96 82.24 981.86 81.79 1195.83 85.31 1347.46 82.45 971.87 82.19 1113.85 82.21 1036.86 81.45 1301.82 880.88 81.88 1308.12 85.42 1314.67 85.3 1399.91 85.45 85.65 1439.26 85.75 1694.98 85.59 1478.6 85.98 1724.49 85.77 1544.17 86.17 1757.27 85.67 1609.74 86.17 1783.5 85.9 1406.47 1678.59 85.83 1924.47 85.53 2078.56 85.7 2212.98 86.2 1819.56 85.91 2016.27 85.46 1829.4 85.64 2032.67 85.37 1885.13 85.79 2062.17 1799.89 85.83 2176.92 85.47 2357.21 85.32 2458.44 85.63 2153.97 85.71 2288.39 2101.51 85.57 2190.03 85.55 85.18 2527.01 85.12 2641.3 2432.31 85.56 2451.91 85.47 2494.36 85.27 2536.81 2657.63 85.43 2575.99 84.89 2664.16 85.16 2618.44 85.77 2673.96 85.38 2631.51 88.8 2683.75 85.12 2641.3 92.96 2687.02 93.35 88.65 2713.14 86.58 2778.45 2700.08 93.28 2703.35 92.96 2709.88 87 57 2719 67 2745.8 86.3 2765.39 86.56 2791.51 85.78 2736 2801.31 83.27 2817.64 79.83 2850.29 82.38 2827.43 78.8 2856.82 80.29 2830.7 75.65 2866.62 85.63 2811.11 80.08 80.72 2847.03 65.68 2889.68 61.34 2989.68 65.68 3072.31 62.64 2899.68 2876.42 66.21 2879.68 61.24 2909.68 60.94 2949.68 3049.68 60.94 2969.68 61.64 3065.78 61.34 3009.68 66.46 3075.58 61.64 3029.68 67.88 3082.11 87.11 3104.96 84.29 3150.67 72.82 79.64 3091.9 87.35 3118.02 84.93 3101.69 84.72 3140.87 3088.64 81.82 3098.43 87 79 85.29 3124.55 3160.46 87.26 3166.99 89.22 3173.52 90.14 3183.31 89.25 3196.37 86.65 86.5 3212.7 86.56 3291.05 86.3 3346.55 3575.58 3700.2 86.44 3369.4 86.37 3588.7 86.45 3706.76 86.42 3467.36 86.27 3631.33 86.56 3742.83 86.18 3493.6 86.41 3644.45 86.42 3769.07 86.18 3500.15 86.32 3667.4 86.54 3792.02 86.31 86.43 86.45 3880.57 86.7 4060.93 86.71 4113.4 86.69 4201.94 86.55 3851.05 86.53 4028.14 86.62 3955.99 86.59 4074.05 86.57 3965.83 86.81 4080.61 3811.7 86.67 4136.36 86.79 4290.48 86.79 4457.73 86.89 4575.78 86.94 4687.28 86.91 4093.73 86.82 4146.2 86.81 4303.6 4083.89 86.68 86.82 4175.71 86.9 4441.33 86.92 4565.95 86.8 4644.65 87.59 4710.23 87.08 4825.01 86.95 4487.24 86.98 4595.46 4372.47 86.76 4418.38 86.97 86.81 4523.31 86.89 4634.81 86.88 4693.84 86.84 4739.75 87.25 4847.97 4611.86 87.05 4700.4 4765.98 86.65 4703.68 86.99 4802.06 86.94 4726.63 86.95 4841.41 87 02 87.11 87.31 4966.02 87.24 5070.96 87.36 5179.17 87.15 4893.88 87.38 5048 87.32 4979.14 87.44 5087.35 87.53 5185.73 87.44 4998.81 87.27 5103.75 87.22 5195.57 4887 32 87 31 87.38 5048 87.32 5169.34 5136.54 87.46 87.56 5352.98 87.77 5480.87 87.41 5274.27 87.35 5330.02 87.66 5431.68 87.69 5510.38 87.9 5579.25 87.9 5654.67 87.6 5467.75 5392.33 87.56 5457.91 87.64 87.5 5520.22 87.59 5631.72 87.55 5680.91 87.82 5726.82 88.66 5526.78 87.83 5638.28 87.78 5694.02 87.42 5739.93 5503.82 88.13 5516.94 87.57 5621.88 5562.85 87.59 5674.35 5651.39 87 45 87.43 5720.26 87.93 5828.48 5700.58 5749.77 87.78 5710.42 87.74 5782.56 87.93 5864.55 87.81 5894.06 87.93 88.02 5985.88 88.09 6192.48 87.97 5999 88.08 6228.55 87.79 6025.23 88.26 6277.74 88.06 6035.07 88.33 6323.65 6087.54 88.19 88.31 6405.63 88.12 6481.06 88.26 6631.9 88.09 6815.54 6349.88 88.24 6412.19 88.25 6504.01 87.54 6415.47 88.09 6523.69 88.57 6422.03 88.27 6556.48 6458.1 88.13 88.25 6504.01 88.06 6671.25 88.24 6854.9 88.3 7028.7 88.9 7179.55 88.43 7245.13 88.27 6556.48 88.1 6753.24 88.19 6943.44 88.32 7110.68 89.07 7195.94 88.29 7314 6618.79 6776.19 88.16 6697.49 88.29 6920.48 88.13 7077.89 88 2 6953.27 88.16 7018.86 88.28 87.9 7186.1 88.27 7307.44 88.42 7176.27 88.22 7228.73 7222.18 88.39 7487.8 88.48 7415.65 88.25 7530.43 88.36 7455.01 88.44 7546.83 7333.67 88.29 7359.91 88.45 7517.31 88.37 7589.46 7507.48 88.6 7612.41 7737.03 88.46 7658.32 88.67 7753.42 88.52 7946.9 88.58 7664.88 88.49 7776.38 88.11 7953.46 88.47 7710.79 88.61 7845.24 88.61 7727.19 88.52 7894.43 88.47 88.6 7914 11 87 8 7960 02 89 14 7966 58 89 13 88.27 7989.53 89.28 8087.91 89 8005.93 89.06 8097.75 89.05 8019.05 89.24 8133.82 88.98 8163.33 8068.23 88.91 8186.29 8314.18 89.03 8219.08 88.73 8389.61 88.86 8245.32 88.5 8399.44 88.88 8255.16 88.39 8425.68 88.73 8287.95 88.59 8432.24 88.46 88.55 8504.38 88.23 8661.79 87.76 8766.73 87.53 8907.74 87.25 9048.75 8468.31 8606.04 88.36 8527.34 87.98 8684.74 87.8 8773.28 88.44 8556.85 88.04 8697.86 87.67 8838.87 88.44 8474.87 88.13 8612.6 87.91 8737.21 8720 82 87.4 8920.85 87.1 9104.49 87.23 8993 87.11 9134.01 8999.56 87.04 9042.19 86.67 87.61 9176.64 86.56 9258.62 87.38 9193.03 85.67 9275.02 87.59 9215.99 86.17 9291.41 9150.4 86.87 9252.06 9242.22 86.02 9314.37 86.25 9337.32 85.77 9507.85 86.08 9360.28 85.56 9527.52 86.1 9383.23 85.64 9543.92 85.97 9409.47 85.51 9560.32 85.21 9675.09 85 9891.52 84.48 9996.46 85.32 9701.33 84.75 9917.76 9579 99 85.43 9589.83 85.56 9648.86 85 17 85.19 9789.87 84.59 9957.11 9947.27 84.71 9980.07 84.5710012.86 84.4 10039.09 84.4710068.61 84.3810078.44 84.2310094.84 84.3510160.43 10166.99 84.37 10212.9 84.2910222.73 84.5910239.13 84.6110245.69 86.32 10252.25 86.8210262.08 94.4310304.72 84.5910271.92 95.2310321.11 85.0610278.48 95.9110330.95 85.9310288.32 95.8910334.23 10298.16 95.2 10344.07 89.810350.63 87.4210353.91 87.2710458.84 87.2710462.12 87.45 94.9610478.52 10471.96 93.6710475.24 95.0710501.47 94.3110514.59 10524.43 86.5610530.99 84.7310540.83 84.6710557.22 86.1210567.06 10583.46 85.510593.29 85.3510612.97 Manning's n Values Sta n Val Sta 0 .094 2736 n Val Sta n Val .015 3075.58 .066 2866.62 .066 3091.9 .06 Bank Sta: Left a: Left Right 2687.02 3104.96 Lengths: Left Channel Right Coeff Contr. Expan. Right Heigens Hert Challer Right
3104.96 1872.8 1725 1469.48
Station= 42 Elevation= 101.73
Station=10321.11 Elevation= 95.91 ∠oo,. Left Levee Station= Right Levee Station=10321.
Blocked Obstructions num= Sta L Sta R Elev Sta L Sta R 6.76 2677.18 93.41 3163.94 10526.2

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 97.85 | Element | Left OB | Channel | Right OB | |
|--------------------|-----------|------------------------|----------|-----------|-----------|--|
| Vel Head (ft) | 0.08 | Wt. n-Val. | 0.094 | 0.049 | 0.060 | |
| W.S. Elev (ft) | 97.77 | Reach Len. (ft) | 1872.80 | 1725.00 | 1469.48 | |
| Crit W.S. (ft) | 84.99 | Flow Area (sq ft) | 11334.20 | 10257.25 | 57652.50 | |
| E.G. Slope (ft/ft) | 0.000212 | Area (sq ft) | 11334.20 | 10257.25 | 57652.50 | |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 6924.05 | 37408.23 | 80667.72 | |
| Top Width (ft) | 10538.57 | Top Width (ft) | 2612.62 | 417.94 | 7508.01 | |
| Vel Total (ft/s) | 1.58 | Avg. Vel. (ft/s) | 0.61 | 3.65 | 1.40 | |
| Max Chl Dpth (ft) | 36.83 | Hydr. Depth (ft) | 4.34 | 24.54 | 7.68 | |
| Conv. Total (cfs) | 8593683.0 | Conv. (cfs) | 476024.8 | 2571796.0 | 5545863.0 | |
| Length Wtd. (ft) | 1559.13 | Wetted Per. (ft) | 2617.18 | 431.50 | 7531.09 | |
| Min Ch El (ft) | 60.94 | Shear (lb/sq ft) | 0.06 | 0.31 | 0.10 | |
| Alpha | 2.12 | Stream Power (lb/ft s) | 0.03 | 1.15 | 0.14 | |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 37557.52 | 26367.80 | 68214.60 | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 7920.53 | 1297.79 | 9504.47 | |
| | | | | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

| RIVER: Ri
REACH: Lo | o Grande
wer Reach | RS: 138.69* | | | | | |
|------------------------|--------------------------------|--------------------------------|----------------|----------------------|----------------|--------------------|----------------|
| INPUT
Descripti | on: RGV-02, | | | | | | |
| | levation Data | num= 437 | | | | | |
| Sta | Elev Sta | Elev Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 94.01 27.49 | 99.96 38.49 | 101.62 | | 101.15 | 74.36 | 93.25 |
| 91.59
182.03 | 91.32 108.84
87.28 200 | 88.57 140.25
83.23 208.98 | 86.19
82.61 | 152.97
241.75 | 86.05
82.33 | | 87.92
82.48 |
| 334.22 | 82.83 447.3 | 84.32 468.07 | 84.99 | 523.4 | 83.91 | | 82.77 |
| 611.12 | 81.62 616.4 | 81.24 699.38 | 81.35 | 711.88 | 82.06 | 720.88 | 84.61 |
| 982.32 | 84.65 996.78 | 84.9 1055.74 | | 1101.34 | | 1160.29 | 84.59 |
| 1165.19 | 86.82 1191.67 | 86.76 1222.56 | | 1240.22 | | 1275.52 | 87.01 |
| 1324.08
1432.14 | 86.95 1335.62
87.17 1447.79 | 86.89 1363.8
86.78 1456.48 | | 1399.11
1499.97 | 87.09 | 1419.1
1522.69 | 87.29
86.85 |
| 1567.79 | 87.05 1580.06 | 86.95 1617.36 | | 1640.83 | | 1653.87 | 86.98 |
| 1672.13 | 86.91 1713.88 | 87 1732.14 | | 1747.75 | | 1760.83 | 86.86 |
| 1781.7 | 86.98 1820.83 | 86.84 1875.59 | | 1893.78 | | 1919.76 | 87.01 |
| 1950.94 | 86.9 1956.14 | 86.99 1988.93 | 86.89 | 2018.5 | | 2049.67 | 86.81 |
| 2063.47
2102.94 | 86.91 2076.63
88.9 2119.83 | 88.42 2085.39
89.66 2135.41 | | 2094.17
2138.02 | | 2098.55
2145.53 | 87.78
92.25 |
| 2152.43 | 92.14 2158.2 | 89.99 2161.08 | | 2183.3887 | | | 87.61 |
| 2201.88 | 87.87 2205.64 | 87.78 2213.15 | 85 | 2220.67 | | 2230.28 | 84.37 |
| 2238.93 | 83.15 2246.96 | 81.63 2250.72 | | 2258.24 | | 2264.88 | 75.75 |
| 2273.53
2316.96 | 74.64 2284.53
57.61 2325.79 | 71.6 2293.12
55.96 2334.62 | | 2304.3460
2354.62 | | 2308.13 | 60.11
56.48 |
| 2380.33 | 57.85 2391.35 | 58.78 2406.96 | | 2416.72 | | 2425.3564 | |
| 2428.76 | 65.57 2440.8 | 69.84 2443.81 | | 2452.84 | | 2464.39 | 72.93 |
| 2482.06 | 75.9 2489.23 | 76.74 2492.82 | | 2497.98 | | 2507.15 | 84.13 |
| 2510.73 | 85.27 2517.9 | 86.91 2521.48 | | 2525.06 | | 2531.86 | 88.2 |
| 2538.65
2589.59 | 87.15 2545.44
88.85 2596.38 | 86.85 2562.42
89.21 2606.56 | | 2572.61
2620.14 | | 2582.79
2637.13 | 87.97
86.55 |
| 2651.28 | 86.11 2670.22 | 85.84 2682.85 | | 2701.77 | 85.5 | 2720.7 | 85.47 |
| 2752.26 | 85.18 2764.88 | 85.3 2780.66 | 85.22 | 2809.05 | | 2824.84 | 85.33 |
| 2856.39 | 85.56 2878.48 | 85.82 2887.96 | | 2903.75 | | 2947.95 | 86.8 |
| 2982.69 | 86.81 3007.96 | 86.65 3017.43 | | 3036.38 | | 3072.57 | 86.63 |
| 3096.38
3216.37 | 86.55 3110.08
86.27 3239.71 | 86.63 3159.54
85.98 3289.01 | 85.77 | 3169.01
3304.8 | | 3188.54
3320.59 | 86.29
85.65 |
| 3339.54 | 85.58 3364.8 | 85.68 3386.9 | | 3415.33 | | 3456.38 | 85.86 |
| 3465.85 | 85.78 3487.95 | 85.83 3510.06 | | 3533.06 | | 3539.88 | 85.94 |
| 3543.29 | 86.21 3570.06 | 86.28 3597.87 | | 3620.59 | | 3649.01 | 86.89 |
| 3671.11
3781.64 | 86.84 3690.06
86.85 3803.74 | 87.01 3709.01
86.65 3835.33 | | 3746.91
3885.85 | 86.86 | 3762.7
3936.38 | 86.77
87.03 |
| 3962.84 | 87.18 3983.31 | 87.03 4005.85 | | 4012.17 | 87.26 | | 87.21 |
| 4050.07 | 87.44 4056.38 | 87.6 4075.4 | | 4097.43 | 87.9 | 4129.01 | 88.05 |
| 4144.8 | 88 4177.73 | 88.12 4184.55 | | 4187.97 | | 4195.33 | 88.03 |
| 4211.84
4338.05 | 88.02 4245.85
88.16 4378.98 | 88.16 4274.27
88.26 4387.96 | | 4280.59
4425.85 | | 4315.33
4470.07 | 88.04
88.42 |
| 4482.7 | 88.29 4526.9 | 88.37 4569.99 | | 4587.04 | | 4618.49 | 87.97 |
| 4643.74 | 87.72 4659.53 | 87.67 4689.37 | | 4754.28 | | 4781.46 | 87.17 |
| 4820.59 | 87.1 4839.45 | 87.31 4874.28 | | 4893.23 | | 4918.49 | 87.58 |
| 4982.71 | 87.74 5020.23 | 87.68 5027.05 | | 5033.87 | | 5037.29 | 88.16 |
| 5044.11
5177.13 | 87.67 5081.63
87.59 5197.6 | 87.8 5107.96
87.57 5204.43 | | 5160.08
5218.06 | | 5173.72
5224.89 | 87.75
87.62 |
| 5235.12 | 87.44 5245.36 | 87.63 5252.18 | | 5329.02 | | 5351.12 | 87.86 |
| 5404.8 | 87.99 5452.17 | 88.31 5467.96 | 88.29 | 5486.91 | 88.44 | 5521.64 | 88.48 |
| 5535.29 | 88.39 5562.57 | 88.53 5572.8 | | 5651.11 | | 5701.64 | 88.46 |
| 5707.96
5850.07 | 88.37 5745.86
87.82 5913.23 | 88.43 5767.96
87.7 5941.64 | | 5790.07
5958.24 | | 5818.48
5965.06 | 87.95
87.49 |
| 5968.47 | 88.02 5975.3 | 87.85 6017.44 | | 6026.91 | | 6049.02 | 87.66 |
| 6124.8 | 87.87 6179.96 | 88.17 6193.59 | 88.09 | 6219.54 | | 6276.38 | 88.32 |
| 6282.7 | 88.41 6314.28 | 88.42 6336.39 | 88.21 | 6342.7 | | 6361.65 | 87.8 |
| 6437.44
6544.8 | 86.36 6462.7
86.78 6596.09 | 86.23 6491.12
87.26 6606.32 | | 6517.64 | | 6535.33
6699.54 | 86.63 |
| 6737.44 | 87.44 6759.82 | 87.61 6763.23 | | 6677.43
6770.04 | | 6780.28 | 86.97
87.26 |
| 6807.57 | 87.18 6814.38 | 87.28 6831.44 | | 6866.91 | | 6896.25 | 87.05 |
| 6903.08 | 87.14 6923.54 | 87 6950.83 | | 7005.86 | | 7031.12 | 87.43 |
| 7065.86 | 87.2 7091.12 | 87.37 7104.32 | | 7114.55 | | 7163.75
7318.49 | 88.33 |
| 7189.59
7343.76 | 87.85 7346.91 | 88.86 7261.22
87.57 7359.55 | | 7312.18 | | 7406.91 | 88.01
87.25 |
| 7435.70 | 86.6 7460.6 | 85.9 7473.23 | | 7527.28 | | 7561.38 | 85.56 |
| 7568.21 | 85.4 7575.03 | 86.07 7581.85 | 86.07 | 7598.9 | | 7605.72 | 86 |
| 7636.43 | 86.15 7650.07 | 86.07 7687.58 | | 7708.05 | | 7718.29 | 86.12 |
| 7755.81 | 85.99 7786.5 | 85.96 7810.38 | | 7844.49 | | 7871.78 | 85.94 |
| 7916.12
8066.21 | 85.82 7943.41
85.73 8103.72 | 85.87 8021.87
85.72 8110.55 | | 8032.09
8141.24 | | 8059.38
8165.12 | 85.79
85.72 |
| 8195.82 | 85.63 8246.98 | 85.57 8253.81 | | 8304.97 | | 8328.84 | 85.52 |
| 8342.49 | 85.42 8366.37 | 85.53 8389.01 | | 8483.76 | | 8516.44 | 85.47 |
| 8559.54 | 85.41 8597.43 | 85.41 8613.22 | | 8649.48 | 85.52 | | 85.42 |
| 8700.64 | 85.68 8707.47 | 85.62 8765.44 | | 8796.15 | 85.67 | 8813.2 | 86.12 |
| 8843.71
8925.76 | 86.02 8857.54
85.43 8942.82 | 86.14 8868.97
85.77 8957.38 | | 8891.08
8983.75 | | 8918.94
9007.62 | 85.85
85.82 |
| 9055.38 | 85.94 9077.36 | 85.84 9086.83 | | 9096.31 | 85.9 | | 86.15 |
| 9121.56 | 85.95 9149.98 | 85.92 9191.03 | | 9197.35 | | 9219.44 | 85.59 |
| | | | | | | | |

```
85.74 9298.39
83.72 9546.55
83.61 9676.17
83.4 9929.87
85.88 9969.51
                                                            85.2 9317.33
83.76 9584.07
83.5 9737.56
83.64 9939.34
84.93 9977.23
                                                                                                84.74 9345.74
83.63 9611.36
83.49 9863.77
84.64 9945.63
85.53 9986.56
                                                                                                                                   83.66 9642.06
83.38 9870.6
84.68 9952.46
87.6 9996.18
  9478.34
9652.29
                                                                                                                                                                        83.55
83.44
   9918.35
                                                                                                                                                                         85.58
   9959.28
                                                            94.4810024.59
87.4310060.96
91.1710176.81
                                                                                                95.3110030.91
87.2710142.33
90.7910189.75
  9999.33
                         93.3710007.03
                                                                                                                                       95.310038.87
                                                                                                                                                                         94.25
10049.48
10152.94
                        88.8510054.79
90.4710158.25
                                                                                                                                    87.2710144.98
88.6110195.39
10200.7 87.8110211.21
10262.72 86.3410267.01
                                                            89.2310229.87
                                                                                               90.3510241.26
                                                                                                                                    89.5210249.85
Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta
0 .066 2138.02 .07 2304.34 .025 2425.35
                                                                                                                                    n Val
                                                                                                                                                                        n Val
                                                                                                                                       .07 2525.06
Bank Sta: Left Right Lengths: Left Channel Right 2138.02 2525.06 1872.8 1725 1469.48 Ineffective Flow num= 1 Sta L Sta R Elev Permanent 2525.0610267.01 88.43 T
                                                                                                                                      Coeff Contr.
                                                                                                                                                                         Expan.
2525.0610267.01 88.43 T

Left Levee Station= 38.49

Right Levee Station=10027.63
Z353.0010207.01 06.43 T
Left Levee Station= 38.49 Elevation= 101.62
Right Levee Station=10027.63 Elevation= 95.435
Blocked Obstructions num= 2
Stat Sta R Elev Sta L Sta R Elev
6.88 2141.14 92.83 7226.92 9996.56 88.35
CROSS SECTION
RIVER: Rio Grande
```

RS: 138.36 REACH: Lower Reach

Description: RGV-02, Updated on left with new survey to Station 1018.77.

Bathymetric elevations translated from IBWC 2008 Cross-sections

| OF-F1 | | | | ons trans
432 | slated fi | rom IBWC | 2008 Cr | oss-secti | .ons |
|--------------------|-------------------|--------------------|----------------|--------------------|-----------|--------------------|---------|--------------------|------------------------|
| Station
Sta | Elevatior
Elev | ı Data
Sta | num=
Elev | 432
Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | | 12.99 | | 24.99 | 101.48 | 34.99 | 101.51 | 40.99 | 100.67 |
| 54.98 | | 86.98 | | 101.97 | 83.69 | 111.97 | 84.01 | 121.97 | 81.8 |
| 136.97 | | 200.95 | 80.97 | 215.95 | 81.14 | 225.95 | 83.21 | 234.94 | 86.67 |
| 240.94 | | 250.94 | 80.78 | 367.91 | 80.78 | 416.9 | 81 | 441.9 | 82.41 |
| 447.9 | | 459.89 | 87.52 | 474.89 | 88.34 | 476.89 | 88.99 | 481.89 | 86.61 |
| 498.89 | | 598.86 | 87.45 | 622.86 | 87.55 | 982.78 | | 1018.77 | 87.55 |
| 1039.84 | | 1066.08 | 88.15 | 1082.48 | 88.06 | 1089.04 | 88.25 | 1095.6 | 88.06 |
| 1118.57 | | 1131.69 | 88.01 | | 88.15 | 1167.77 | | 1174.33 | 88.08 |
| 1187.45 | | 1190.73 | 88.13 | 1213.7 | 88.15 | 1216.98 | 87.97 | | 88.22 |
| 1266.18 | | 1298.96 | 88.35 | 1308.74 | 88.17 | 1334.81 | | 1347.85 | 88.18 |
| 1377.18 | | 1383.7 | 88.29 | 1399.99 | 88.47 | | 88.46 | 1439.1 | 88.38 |
| 1471.69 | | 1478.21 | | 1514.05 | | 1520.57 | | 1533.61 | 88.57 |
| 1536.87 | | 1543.39 | 91.5 | 1549.9 | | 1553.16 | | 1556.42 | 89.8
92.09 |
| 1559.68
1595.53 | | 1562.94
1605.31 | 92.6
91.38 | 1569.46
1621.6 | | 1582.49
1631.38 | | 1589.01
1644.41 | 89.24 |
| 1647.67 | | 1654.19 | | 1660.71 | | 1667.23 | | 1683.52 | 79.82 |
| 1686.78 | 78.43 | 1693.3 | | 1696.56 | 72 38 | 1706.34 | | 1712.85 | 65.86 |
| 1716.11 | 65.68 | 1723.56 | | 1725.56 | | 1735.56 | | 1741.56 | 53.23 |
| 1759.56 | | 1764.56 | | 1776.56 | | 1787.56 | | 1799.56 | 56.22 |
| 1816.56 | | 1827.19 | 65.68 | | 66.07 | 1840.3 | 69.57 | 1846.86 | 74.1 |
| 1853.41 | | 1856.69 | 79.88 | | | 1886.18 | | 1899.29 | 86.19 |
| 1909.12 | | 1915.68 | | 1918.96 | | 1945.17 | | 1964.84 | 88.97 |
| 1984.5 | | 2007.44 | | 2023.83 | | 2033.66 | | 2053.32 | 86.66 |
| 2059.88 | | 2076.26 | | 2089.37 | | 2095.93 | | 2109.04 | 85.29 |
| 2128.7 | | 2148.36 | | 2164.75 | 84.21 | 2171.3 | | 2181.13 | 84.05 |
| 2194.24 | | 2210.63 | | 2240.12 | | 2246.68 | | 2256.51 | 84.3 |
| 2272.89 | | 2289.28 | | 2302.39 | | 2312.23 | | 2322.07 | 86.14 |
| 2328.63
2397.5 | | 2338.47
2420.46 | 86.63
87.27 | 2348.3
2446.7 | | 2384.38
2456.54 | | 2390.94
2476.22 | 87.07
86.82 |
| 2505.73 | | 2531.97 | | 2538.53 | 86 65 | 2594.29 | | 2604.13 | 86 43 |
| 2613.97 | | 2627.09 | 86.25 | 2656.6 | | 2663.16 | | 2699.24 | 86.42
85.3
84.74 |
| 2718.92 | | 2732.04 | 84.96 | 2738.6 | 85.06 | 2755 | 84.67 | 2771.4 | 84.74 |
| 2791.08 | | 2800.91 | | 2817.31 | 84.77 | 2840.27 | | 2869.79 | 85.01 |
| 2876.35 | 84.91 | 2912.43 | 85.17 | 2922.27 | 84.96 | | 84.97 | 2968.18 | 85.38 |
| 2994.42 | | 3014.1 | 85.74 | 3030.5 | 85.88 | | | 3082.98 | 86.92 |
| 3089.54 | | 3112.49 | | 3135.45 | | 3155.13 | | 3174.81 | 86.89 |
| 3214.17 | | 3230.57 | 86.7 | 3250.24 | 86.8 | 3273.2 | | 3283.04 | 86.64 |
| 3306 | | 3332.24 | 86.89 | 3338.8 | | 3358.48 | 87.04 | 3371.6 | 87.03 |
| 3381.44 | | 3410.95 | | 3420.79 | | 3443.75 | | 3466.71 | 87.19 |
| 3483.11 | | 3489.67
3558.54 | | 3502.79
3578.22 | | 3515.91
3611.02 | | 3529.03
3627.42 | 87.95
89.09 |
| 3535.59
3643.82 | | 3679.9 | | 3732.37 | | 3761.89 | | 3768.45 | 89.22 |
| 3788.13 | | 3797.97 | 89.26 | | 89.11 | | | 3902.92 | 89.19 |
| 3919.32 | | 3935.72 | | 3965.24 | 89.43 | | | 4024.27 | 89.38 |
| 4034.11 | | 4043.95 | | 4099.71 | | 4109.55 | | 4119.39 | 88.57 |
| 4145.62 | | 4162.02 | 88 | 4184.98 | | 4194.82 | | 4207.94 | 87.04 |
| 4244.02 | | 4253.86 | 86.93 | 4260.42 | 86.7 | 4309.61 | | 4329.29 | 86.76 |
| 4345.69 | | 4375.21 | | 4385.05 | | 4404.73 | | 4430.97 | 87.54 |
| 4473.6 | | 4499.84 | | 4529.36 | | 4535.92 | 87.68 | 4572 | 87.66 |
| 4617.91 | | 4627.75 | | 4735.98 | | 4742.54 | 87.46 | 4798.3 | 87.42 |
| 4857.34 | | 4880.3 | | 4922.93 | | 4936.05 | | 4985.25 | 88.65 |
| 5001.65
5109.88 | | 5021.33
5162.36 | | 5027.89
5168.92 | | 5050.84
5191.87 | | 5103.32
5244.35 | 88.83 |
| 5250.91 | | 5290.27 | | 5313.23 | | 5336.19 | 88.19 | 5365.7 | 87.58 |
| 5398.5 | | 5405.06 | | 5434.58 | 87.26 | 5464.1 | | 5493.61 | 87.37 |
| 5500.17 | | 5526.41 | | 5546.09 | 87.48 | 5572.33 | | 5582.17 | 87.41 |
| 5605.13 | | 5624.81 | 87.36 | 5641.2 | 87.26 | 5683.84 | | 5703.52 | 87.83 |
| 5746.16 | | 5782.23 | 88.14 | 5841.27 | 88.52 | 5847.83 | | 5880.63 | 88.65 |
| 5903.59 | | 5910.15 | | 5929.83 | 87.45 | 5956.06 | | 6008.54 | 84.45 |
| 6034.78 | | 6041.34 | 84.36 | 6064.3 | 84.36 | 6083.98 | | 6093.81 | 84.97 |
| 6110.21 | | 6120.05 | | 6165.97 | | 6172.53 | | 6211.89 | 85.9 |
| 6215.17 | | 6257.8 | | 6280.76 | | 6300.44 | | 6320.12 | 86.46 |
| 6366.04 | | 6405.39 | | 6411.95 | | 6454.59 | | 6500.51 | 85.72 |
| 6530.02 | | 6539.86 | 85.52 | 6598.9 | | 6612.02 | | 6625.14 | 86.48 |
| 6641.54 | | 6661.22 | 86.05 | 6664.5
6762.89 | | 6687.45 | | 6703.85 | 86.77 |
| 6726.81
6844.88 | | 6736.65
6867.84 | | 6917.04 | 87.72 | 6798.97
6923.6 | | 6828.49
6936.72 | 89.22
87.36 |
| 6949.84 | | 6953.12 | | 6966.24 | | 6976.08 | | 6992.47 | 86.2 |
| 6999.03 | | 7015.43 | 85.91 | | 84.66 | 7071.19 | | 7084.31 | 83 |
| 7986.25 | | 8025.6 | | 8035.44 | 83.15 | 8074.8 | | 8104.32 | 83.24 |
| 8117.44 | | 8133.84 | | 8160.08 | | 8212.55 | | 8228.95 | 83.62 |
| 8251.9 | 83.59 | 8268.3 | 83.79 | 8284.69 | 83.73 | 8320.77 | 83.83 | 8337.16 | 83.99 |
| 8379.79 | | 8386.35 | | 8406.03 | | 8428.98 | | 8438.82 | 84.51 |
| 8448.66 | | 8484.73 | | 8491.29 | | 8507.69 | | 8533.92 | 84.76 |
| 8543.76 | 85.09 | 8556.88 | 85.19 | 8573.27 | 85.02 | 8615.9 | 85.41 | 8625.74 | 85.14 |

```
85.52 8707.72
85.7 8760.19
86.14 8812.66
               85.57 8668.37
                                                             85.68 8714.28
               85.67 8750.35
86.03 8806.1
                                                             86.2 8770.03
85.94 8825.78
86.15 8897.92
                                                                                    85.85 8786.43
86.04 8845.45
 8733.96
                                                                                                           86.41
85.92
               86.09 8868.41
 8852.01
                                      85.89 8874.97
                                                                                    85.64 8911.04
                                                                                                           85.58
 8930.72
                85.98 8940.55
                                      86.05 8956.95
                                                             85.51 8979.91
                                                                                         85 8989.74
                                                                                    82.69 9645.6
 8999.58
               84.19 9029.09
                                      82.52 9632.49
                                                             82.52 9635.76
                                                                                                           84.68
               85 9678.4
92.87 9704.63
                                      85.36 9684.95
94.13 9707.91
                                                             86.11 9688.23
94.54 9721.03
                                                                                    86.91 9694.79
94.52 9734.14
 9701.35
  9740.7
9757.1
              94.69 9743.98
87.51 9763.66
                                      94.06 9747.26
87.27 9855.48
                                                             92.36 9750.54
87.27 9862.04
                                                                                    89.79 9753.82
88.04 9868.59
                                                                                                           88.09
                    93 9878.43
                                      93.52 9884.99
 9875.15
                                                             93.63 9901.39
                                                                                     93.3 9907.95
 9917.78 86.93 9921.06
Manning's n Values num=
Sta n Val Sta n Val
O7 168
                                      n Val Sta n Val Sta
.07 1686.78 .025 1853.41
      Sta n Val
0 .066
                                                                                   n Val
                                                                                                          n Val
                                                                                     .07 1945.17
                .066 1589.01
                                                                                                            .066
Bank Sta: Left Right
                                     Lengths: Left Channel
                                                                                     Coeff Contr.
                                                                       Right
                                                                                                           Expan.
          1589.01 1945.17
1569.01 1743.17
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 1569.46 93.67 T
1945.17 9921.06 89.08 T
1945.17 9921.06 89.08 T

Left Levee Station= 34.99 Elevation=
Right Levee Station= 9734.14 Elevation=
Blocked Obstructions num= 2

Stat L Sta R Elev Sta L Sta R Elev
5.63 474.89 87.97 8868.41 9695.77 85.89
                                                      Elevation= 101.51
                                                                        94.96
CROSS SECTION OUTPUT Profile #Design Flow
                                         97.25
  E.G. Elev (ft.)
                                                      Element
                                                                                           Left OB
                                                                                                           Channel
                                                                                                                         Right OB
                                                                                         0.066
                                                                                                          0.027
1725.00
                                                                                                                         0.066
   Vel Head (ft)
                                                      Wt. n-Val.
                                                      Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                         96.99
92.44
  W.S. Elev (ft)
Crit W.S. (ft)
                               92.44
0.000162
125001
                                                                                                          8142.44
  E.G. Slope (ft/ft)
                                                                                        13607.03
                                                                                                                        85035.32
                                                                                                          8142.44
                                                      Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
                                    125000.00
9869.54
                                                                                          3236.08
1537.49
  O Total (cfs)
                                                                                                          51139.40
                                                                                                                          70624 53
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                           356.16
                                                                                                                           1.13
                                          1.65
                                                                                              0.64
                                                                                                             6.28
  Max Chl Dpth (ft)
                                                      Hydr. Depth (ft)
                                                                                                          4019511.0
  Conv. Total (cfs)
Length Wtd. (ft)
                                     9824888.0
                                                      Conv. (cfs)
Wetted Per. (ft)
                                                                                          254352.8
                                                                                                                           5551025.0
                                      1670.40
                                                      Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                          0.03
                                                                                                           0.22
                                                                                                                           0.08
  Min Ch El (ft)
                                        48.80
                                          6.20
  Alpha
                                                                                              0.02
                                                                                                              1.38
                                                                                                                              0.09
  Frctn Loss (ft)
                                        0.06
  C & E Loss (ft)
                                                    Cum SA (acres)
                                                                                          7741.86
                                                                                                          1267.13
                                                                                                                         8982.13
```

Warning: The cross-section end points had to be extended vertically for the computed water surface. Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. Note:

CROSS SECTION

RIVER: Rio Grande

RS: 138.04* REACH: Lower Reach

| INPUT | | | | | | | | | |
|--------------------|---------|--------------------|-------|------------------|-------|--------------------|--------|--------------------|----------------|
| Description | n: RGV- | -02. | | | | | | | |
| Station El | | | num= | 443 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 90.75 | 26.26 | 93.04 | 47.6 | 95.38 | 70.74 | 101.32 | 89.61 | 98.28 |
| 120.2 | 88.5 | 134.47 | 85.38 | 153.5 | 82.22 | 173.87 | 80.73 | 228.65 | 79.83 |
| 253.25 | 80.6 | 268.2 | 82.49 | 274.67 | 84.64 | 284.39 | 84.23 | 289.06 | 82.72 |
| 310.63 | 79.19 | 369.11 | 79.19 | 418.01 | 79.47 | 442.96 | 80.27 | 460.91 | 82.89 |
| 475.89 | 83.35 | 482.87 | 82.7 | 515.37 | 83.82 | 543.43 | 86.75 | 555.44 | 86.88 |
| 577.48 | 86.28 | 623.57 | 86.47 | 758.8 | 86.55 | 982.78 | 86.61 | 1061.47 | 86.55 |
| 1105.77 | 87.12 | 1116.85 | 87.21 | 1123.5 | 86.81 | 1134.58 | 87.25 | 1145.67 | 86.99 |
| 1172.26 | 87.17 | 1194.42 | 87.12 | 1232.1 | 87.18 | 1253.25 | 87.28 | 1276.43 | 87.2 |
| 1318.53 | 87.34 | 1360.35 | 87.21 | 1371.73 | 87.29 | 1424.92 | 87.24 | 1484.76 | 87.36 |
| 1543.06 | 87.41 | 1568.26 | 87.36 | 1593.45 | 87.49 | 1606.05 | 87.41 | 1631.04 | 87.47 |
| 1694.27 | 87.5 | 1732.07 | 87.41 | 1763.56 | 87.52 | 1776.16 | 87.64 | 1801.36 | 87.56 |
| 1821.65 | 87.65 | 1865.97 | 87.67 | 1877.06 | 87.77 | 1888.13 | 88.18 | 1894.79 | 88.82 |
| 1901.43 | 90.59 | 1910.3 | 90.6 | 1914.73 | 89.97 | 1921.38 | 87.8 | 1930.24 | 87.27 |
| 1952.41 | 86.97 | 1967.92 | 87.1 | 1994.52 | 87.12 | 2041.06 | 86.94 | 2052.14 | 87.09 |
| 2087.6 | 86.98 | 2122.66 | 86.99 | 2135.26 | 86.89 | 2162.97 | 86.96 | 2204.58 | 86.86 |
| 2311.67 | 86.86 | 2322.58 | 86.74 | 2362.09 | | 2380.21 | 86.69 | 2399.89 | 86.84 |
| 2462.23 | 86.67 | 2479.97 | 86.87 | 2506.57 | 86.83 | 2526.52 | 86.93 | 2546.47 | 86.71 |
| 2570.85 | 86.77 | 2588.58 | 86.67 | 2608.54 | 87.05 | 2615.18 | 84.33 | 2617.4 | 84.38 |
| 2624.05 | 86.71 | 2639.57 | 86.05 | 2648.43 | 85.92 | 2688.6 | 85.82 | 2719.88 | 85.89 |
| 2734.89 | 85.82 | 2795 | 85.76 | 2836.86 | 85.84 | 2876.76 | 85.85 | 2903.36 | 85.76 |
| 2925.53 | 85.89 | 2951.47 | 85.69 | 2976.52 | | 2982.78 | 86.08 | 2995.3 | 87.22 |
| 3007.8 | | 3018.8686 | | | | 3032.85 | | 3045.37 | 88.17 |
| 3058.53 | | 3062.97 | | 3069.62 | 91.87 | 3071.83 | | 3082.92 | 91.75 |
| 3087.84 | | 3095.22 | | 3100.15 | 85.86 | 3110 | | 3119.85 | 83.86 |
| 3131.71 | | 3146.36 | | 3156.77 | | 3161.69 | 85.46 | 3174 | 82.18 |
| 3180.51 | | 3190.7780 | | | | 3203.54 | | 3210.93 | 79.43 |
| 3223.24 | 78.26 | 3229.3 | | 3235.54 | | 3240.47 | | 3243.95 | 68.91 |
| 3268.33 | | 3273.22 | | 3284.37 | | 3287.36 | | 3302.34 | 59.72 |
| 3308.24 | | 3323.26 | | 3338.27 | | 3348.27 | | 3359.95 | 57.05 |
| 3367.51 | | 3374.5759 | | | | 3394.73 | | 3396.99 | 65.37 |
| 3403.74 | | 3412.75 | | 3421.75 | | 3435.26 | 78.76 | 3448.882 | |
| 3457.78 | | 3475.79 | | 3479.86 | | 3492.07 | | 3500.21 | 88.05 |
| 3508.73 | | 3528.69 | | 3541.67 | 87.48 | 3549.9 | | 3566.37 | 86.85 |
| 3585.58 | | 3602.05 | | 3613.03 | 86.32 | 3629.5 | | 3645.97 | 86.08 |
| 3673.41 | | 3699.58 | | 3711.77 | | 3728.31 | | 3736.54 | 86.17 |
| 3783.21 | | 3805.19 | | 3833.83 | | 3849.13 | | 3870.46 | 87.77 |
| 3895.83 | | 3907.07 | | 3927.42 | | 3964.03 | | 3980.31 | 87.18 |
| 4019.44 | | 4035.92 | | 4057.61 | | 4086.09 | | 4102.37 | 86.5 |
| 4114.57 | | 4134.81 | | 4154.04 | | 4167.77 | | 4200.01 | 86.08 |
| 4225.45 | | 4250.18 | | 4297.66 | | 4313.35 | | 4332.58 | 86.07 |
| 4354.55 | | 4384.77 | 86.23 | 4409.5
4538.6 | | 4453.44
4552.33 | | 4472.67
4568.81 | 86.67 |
| 4489.15
4588.04 | | 4505.16
4596.28 | 86.76 | 4642.98 | | 4651.63 | | 4670.45 | 86.63
86.65 |
| 4696.38 | | 4733.01 | | 4763.84 | | 4780.32 | | 4807.79 | 87.26 |
| 4843.5 | | 4870.97 | 87.58 | 4884.7 | | 4898.44 | | 4907.79 | 87.5 |
| 4932.36 | 87.55 | 4940.5 | | 4964.92 | | 5002.82 | 87.44 | 5019.3 | 87.24 |
| 5046.28 | | 5062.56 | | 5074.77 | | 5002.82 | | 5019.3 | 88.11 |
| 5115.45 | | 5127.66 | | 5152.07 | | 5167.63 | | 5188.69 | 87.11 |
| 5209.04 | | 5233.55 | | 5245.65 | | 5280.25 | | 5306.68 | 86.52 |
| 5332.44 | | 5351.67 | 86.02 | 5370.9 | | 5409.36 | | 5414.85 | 85.68 |
| 5453.15 | | 5472.53 | | 5519.23 | | 5535.71 | 86.07 | 5563 | 86.24 |
| 5155.15 | 33.73 | 5112.55 | 05.01 | 5515.25 | 05.05 | 5555.71 | 00.07 | 3303 | 50.27 |

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86.02 5583.35
                                                             85.57 5758.29
  5640.09
                86.24 5676.92
                                      85.74 5722.5
85.37 5865.33
                                                                                    85.55 5782.69
85.61 5941.31
                                                                                                           85.47
85.53
  5957.59
                85.75
                         5980.7
                                       85.78 6052.13
                                                             86.08 6104.02
                                                                                    86.12 6120.79
                                                                                                           86.22
                86.07 6194.96
  6140.62
                                       86.08 6238.91
                                                             86.26
                                                                       6244.4
                                                                                    86.17 6277.37
                                                             85.56 6373.51
  6315.83
                86.01 6340.54
                                      85.69 6368.01
                                                                                    85.64 6422.95
                                                                                                           85.42
                85.64 6502.62
85.82 6685.66
                                        85.5 6521.84
85.8 6744.33
                                                             85.55 6541.07
86.05 6771.81
                                                                                    85.34 6604.31
86.02 6791.03
  6475.14
  6659.18
                                                                                                           85.85
                                                             83.91 6900.91
84.5 7031.38
84.65 7178.34
84.18 7395.35
86.16 7565.65
                                      84.24 6878.93
84.08 7010.78
84.39 7139.89
  6813.01
                85.44 6860.56
                                                                                    83.75 6925.63
84.53 7051.99
  7087.69
                84.14 7123.4
                                                                                    84.52
                                                                                             7211.3
                                                                                                           84.48
                                      84.39 7139.89
84.41 7323.92
84.99 7543.88
85.47 7645.31
85.08 7722.85
                84.39 7252.51
84.61 7480.5
                                                                                    84.66 7425.56
86.39 7598.61
  7447.53
                                                                                                           86.29
                86.02 7637.43
                                                             85.35 7667.29
84.98 7755.4
                                                                                    85.38 7670.03
84.12 7768.92
  7621.16
                                                                                                           85 16
                85.32 7702.99
  7690.31
                                                                                                           83.68
                83.52 7800.14
83.07 7938.42
                                       83.57 7848.95
                                                             83.46 7865.21
83.07 7970.97
                                                                                    83.27 7893.69
                                                                                                           83.11
                83.4 8064.52
83.07 8154
82.99 8320.76
                                                             83.37 8101.12
83.02 8227.21
                                      83.21 8084.85
83.16 8182.47
  8044.18
                                                                                    83.04 8121.45
                                                                                                           83.17
                                                                                    83.04 8239.42
  8284.16
                                        83.1 8332.97
                                                             83.03 8345.16
                                                                                    83.25 8381.78
                                                                                                           83.13
  8410.25
8487.52
                83.25 8422.45
83.49 8495.66
                                      83.18 8442.78
83.35 8503.8
                                                             83.28 8450.92
83.57 8548.54
                                                                                    82.87 8463.12
83.73 8572.95
                                                                                                           84.15
                                      84.09 8621.76
84.3 8739.71
                83.92 8601.42
84.42 8731.57
                                                             84.05 8658.91
84.46 8757.79
                                                                                    84.2 8680.88
84.4 8768.18
  8585.14
                                      84.03 8808.85
83.43 8922.57
83.75 9062.64
                                                                                    84.27 8845.47
83.54 8993.98
  8776.31
                 84.2 8788.52
                                                             84.22 8829.19
                                                                                                           84.02
  9013.21
                83.84 9026.94
                                                             83.95 9070.88
                                                                                    83.81 9098.34
                                                                                                           84.03
                                      84.2 9175.24
84.26 9274.12
83.74 9383.98
 9139.54
9205.46
                84.08 9156.02
84.45 9213.7
                                                             84.09 9183.49
84.18 9279.62
                                                                                    84.34 9191.73
84.32 9309.83
                                                                                                           84.03
  9334 54
                84.26 9367.51
                                                             83 34 9408 69
                                                                                     82.5 9496.25
                                                                                                            82 5
                82.63 9561.33
                                                                                    83.18 9675.21
                                      82.85 9614.21
                                                             83.21 9634.54
  9536.92
                83.21 9768.76
83.14 9916.79
                                      83.27 9821.64
83.21 9925.03
                                                                                    83.32 9874.52
84.4 9957.99
   9740.3
                                                             83.21 9833.85
                                                                                                           83.32
                                                                                    93.9510004.68
91.0410038.59
                                      89.46 9984.34
  9966.23
                86.86 9974.47
                                                             90.73 9996.54
                                                                                                           94.76
10008.59
               94.38 10016.4
87.6910055.54
91.7710164.77
87.4110213.78
                                      92.15 10020.3
87.2710141.35
                                                             91.3410032.94
87.2710145.96
                                                                                    87.5410151.62
                                                                                                            88.9
10157 27
                                       93.3810168.68
                                                             93.5410179.87
                                                                                    93 2810199 65
                                      85.0810219.43
10203.83
Manning's n Values
                             Sta n Val Sta
32.92 .066 3190.77
                                                                                    n Val Sta
      Sta n Val Sta
0 .102 3082.92
                                                     Sta
                                                             n Val
                                                              .015 3374.57
Bank Sta: Left Right 3082.92 3475.79
                                     Lengths: Left Channel Right 1700 1725 1637.5
                                                                                     Coeff Contr.
                                                                                                           Expan.
                                     1700
2
91.75
87.62
3475.7910219.43
                                                      Elevation= 101.32
                                                     Elevation=
                                                               Elev
CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 137 71

Description: RGV-02, Updated on left with new survey to Station 1104.16.

Bathymetric elevations translated from IBWC 2008 Cross-sections

Station Elevation Data 430 Sta Elev Sta Elev Sta 85.16 44.78 97.01 106.48 86.13 101.13 51.75 124.39 87.61 58.71 100.73 168.36 78.7 298.34 87.83 86.62 71.65 181.36 89.45 83.06 204.36 320.33 80.4 222.35 84.9 330.33 79.54 256.35 80.37 311.33 81.95 479.3 578.28 340.33 370.32 80.18 556.28 86.3 489.3 79.28 516.29 544.29 86.06 85.11 85.39 759.24 85.54 902.21 85.53 1027.18 85.67 1104.16 85.97 1183.11 86.16 1320.82 86.05 1268.36 86.02 1284.75 1107.7 86.09 86.2 1392.95 86.49 1520.82 86.13 1399.51 86.36 1537.21 86.08 1484.75 86.47 1651.96 1330 65 86.22 1435.57 86.52 1586.39 1510.98 1668 35 86 72 1678 19 85 91 1694 58 86 77 1710 98 86 25 1720 81 86 25 86.51 1815.89 86.71 1947.04 86.56 1871.63 86.79 2015.89 86.66 1966.71 1904.42 86.61 1914.25 2045.4 2258.52 86.87 2058.52 86.96 2324.09 86.78 2124.09 86.92 2347.04 86.78 2212.62 87.01 2402.78 86.97 2245.4 87.02 2429.01 87.15 2494.58 2710.98 87.18 2510.98 87.26 2776.55 87.07 2586.39 87.25 2792.95 87.04 2655.24 87.47 2809.34 87.23 2704.42 88.29 2819.18 87.49 2871.63 86.17 2989.67 2829 01 93 09 2842 13 93.11 2848.68 91 83 2858 52 86 48 86.19 2953.6 86.11 3035.57 3015.9 85.98 3029.01 85.84 3051.96 86.11 3061.8 85.78 3071.64 3215.92 85.83 3133.94 85.67 3311.02 85.93 3147.05 85.61 3386.44 85.75 3170.01 85.52 3399.56 85.93 3104.42 85.81 3297.9 85.65 3452.03 3550.41 85.34 3458.59 85.48 3474.98 85.35 3658.62 85.36 3514.33 85.23 3665.18 85.44 3537.29 85.5 3684.86 85.49 3638.95 85.51 3783.24 85.05 3868.5 85.24 3796.35 85.85 3875.06 85.38 3806.19 85.87 3881.62 3724.21 85.39 3753.72 85 14 85.3 3845.54 85.05 3868.5 80.56 3891.45 3884.89 80.45 3888.17 81.95 3894.73 84.28 3898.01 85.23 84.61 3920.97 83.29 4061.98 83.55 3960.32 83.13 4134.12 83.33 3989.83 83.29 4147.24 83.85 3934.08 83.18 4121 83.15 83.18 4121 83.12 4239.06 82.9 4344 82.74 4511.24 90.33 4560.43 83.04 4212.82 83.02 4311.2 82.87 4488.29 4199.71 4301.37 83 4271.85 83.12 4380.07 83.11 4281.69 82.93 4435.82 82.81 4521.08 91.38 4576.83 82.67 4540.75 4481.73 83.38 84.83 4557.15 91.41 4583.39 4593.22 83.76 4599.78 80.43 4612.9 77.24 4626.02 76.71 4639.13 77.41 78.3 4665.37 79.2 4671.93 77.2 4708 82.13 4675.21 78.26 4717.84 78.12 4698.16 81.7 4681.76 4691.6 78.51 77.2 4708 75.99 4747.35 65.65 4789.98 78.21 4730.95 76.61 4780.14 4721.12 4763.75 75.65 4737.51 68.17 4786.7 77.94 4760.47 65.46 4836.98 64.64 4896.98 65.53 4976.9 86.41 5026.09 63.64 4916.98 66.9 4986.74 4856.98 64.64 4876.98 61.64 4936.98 5009 69 86.7 5019.53 87.18 5108.07 87.05 5049.05 86.58 5058.88 87.88 5186.78 86 82 5170.38 5196.61 87.98 5242.52 88.12 5262.2 87.99 5268.76 88.28 5285.15 88.15 5294.99 88.41 5314.67 88.26 5370.42 87.93 5324.51 88.02 5399.93 88.28 5334.34 88.31 5347.46 87.72 5452.4 5452.4 5354.02 88.36 5413.05 87.86 5475.35 87.52 5498.31 87.69 5590.13 87.89 5511.43 87.58 5521.26 87.88 5537.66

86.62 5816.4

86.89 5711.46

```
86.4 5977.09
86.19 6068.91
               86.63 5921.34
86.49 6009.88
                                                            86.2 5954.13
86.43 6059.07
                                                                                                        86.19
86.33
  6118.1
               86.17 6141.05
                                     85.87 6154.17
                                                            85.98 6160.73
                                                                                  85.79
                                                                                           6180.4
                                                                                                        85.95
 6186.96
               85.72 6206.64
                                              6213.2
                                                            85.65 6229.59
                                                                                  85.73 6245.99
                                     85.17 6285.34
 6252.55
               85.31 6272.22
                                                            85.45 6295.18
                                                                                  85.13 6301.74
                                                                                                        86.03
                                     87.13 6337.81
84.98 6403.4
                                                            85.78 6357.48
84.58 6419.79
                                                                                  85.27 6367.32
85 6432.91
               86.84 6327.97
                           6387
 6380.44
               85.38
               84.86 6482.1
84.82 6577.2
                                                                                  84.84 6524.73
84.47 6649.34
  6465.7
                                     84.67 6488.66
                                                            84.83 6508.33
                                                            84.68 6609.99
                                                           84.52 6714.93
83.82 6806.75
                                                                                  86.14 6721.49
83.53 6846.09
 6688.69
                84.9 6698.53
                                     84.37 6705.09
                                                                                                        86.24
                                     84.37 6705.09
84.51 6780.51
83.49 6908.38
83.49 7059.18
83.61 7249.32
               85.03 6760.84
83.35 6885.43
 6865.76
                                                            83.29 6928.05
                                                                                   83.4
                                                                                           6980.5
                                                                                                        83.39
                                                                                  83.25 7144.42
               83.2 7006.73
83.38 7183.76
                                                           83.31 7124.75
83.71 7272.27
 6993.61
 7154.25
                                                                                  83.89 7337.84
                                                                                                        83.74
                                                                                  83.63 7459.14
83.57 7593.55
83.22 7750.91
82.99 7885.32
83.62 8347.56
               83.82 7393.57
83.51 7501.75
83.48 7649.28
83.21 7819.75
                                     83.71 7413.24
83.68 7527.98
83.37 7701.73
83.07 7832.86
 7354.23
                                                            83.83 7446.02
83.72 7547.65
                                                            83.43 7734.52
 7629.61
                                                                                                        83.38
                                                           82.93 7872.2
83.67 8331.17
 8259.05
               82.84 8285.27
                                       83.4 8314.78
                                                                                                        83.76
                                     83.45 8390.18
83.91 8455.75
                                                           83.92 8403.29
84.11 8481.97
                                                                                  84.11 8416.41
84.03 8491.81
 8360.67
               83.15 8377.07
 8429.52
               84.08 8439.35
                                                                                                        84.15
               83.92 8544.26
83.15 8629.5
                                     83.54 8567.21
83.89 8662.28
                                                           83.22 8586.88
83.91 8688.51
                                                                                  83.13 8603.27
83.79 8704.9
 8531.15
                                                                                                        83 37
                                                                                  83.13 8777.02
 8721.29
               83.74 8734.4
                                     83.08 8750.79
                                                            83.34 8760.63
                                                                                                        83.32
                                     83.08 8750.79
83.09 8845.87
83.5 8960.61
82.73 9026.17
84.29 9088.46
                                                                                  82.99 8911.43
83.5 8993.39
               83.04 8836.03
 8921.27
               83.06 8931.1
                                                            83.27 8983.56
                                                                                                        83.36
               83.56 9016.34
84.13 9078.63
84.67 9137.64
 9009.78
9058.96
                                                           83.84 9045.84
84.53 9095.02
                                                                                  83.98 9052.4
84.36 9114.69
                                                                                                        83.71
                                                                                  85.02 9193.37
85.2 9272.05
 9124 52
                                     84.96 9154.03
                                                            84 85
                                                                     9173.7
                                                                                                        85 36
               85.43 9242.54
                                     85.09
                                              9249.1
                                                            85.31 9265.49
 9229.43
                                                                                                        85.42
                                     84.32 9304.83
 9278.6
9344.17
               84.63 9288.44
82.69 9350.73
                                                           84.63 9321.22
82.48 9875.26
                                                                                  84.55 9334.34
82.71 9891.65
               83.19 9953.94
                                     83.89 9970.33
 9911.32
                                                            83.8310003.11
                                                                                  84.0510055.57
                                                                                                          83.9
10078.51
                                                           84.1210163.75
84.8810252.27
                                                                                  84.12 10186.7
86.94 10262.1
               84.0310121.13
                                     83.8910130.97
                                                                                                         93.04
               83.66 10232.6
                                     84.0710245.71
                                                           94.82 10308
87.2710432.57
10268 66
               94.8210281.77
                                       94 510301 44
                                                                                  93 8210311 28
                                                                                                        92 64
               88.1210327.67
                                     87.2710429.29
10321.11
                                                                                  87.3610439.13
10445.69
               93.3210448.96
                                     93.9910471.91
                                                           92.9810478.47
                                                                                  89.4610481.75
                                                                                                        88.53
               85.2810494.86
                                     83.03 10504.7
                                                            83.1310511.25
Manning's n Values
                           Sta n Val Sta
76.83 .066 4780.14
                                                           n Val
                                                                                 n Val
      Sta n Val
                                                                                                        n Val
                                                            .015 4976.9
                                                                                                          .067
                .102 4576.83
                                                                                   .066 5009.69
Bank Sta: Left Right
                                   Lengths: Left Channel
                                                                     Right
                                                                                   Coeff Contr
                                                                                                        Expan.
                                  1088.69 1566 1979.92
106.48 Elevation= 101.13
         4576.83 5006.41
Left Levee
                 Station= 106.48
Station=10268.66
Blocked Obstructions num=
Sta L Sta R Elev Sta L
                                              Sta R
    Sta L Sta R Elev Sta L Sta R 60.85 4556.62 91.44 5394.9310289.58
                                                            Elev
CROSS SECTION OUTPUT Profile #Design Flow
  Vel Head (ft)
                                         0.12
                                                     Wt. n-Val.
                                                                                          0.102
                                                                                                         0.047
                                                                                                                         0.067
  W.S. Elev (ft)
                                        96.40
                                                    Reach Len. (ft)
Flow Area (sq ft)
                                                                                       1088.69
                                                                                                       1566.00
                                                                                                                      1979 92
                                                                                      21970.31
  Crit W.S. (ft)
                                        85.40
                                                                                                      10538.68
                                                                                                                      44549.96
                                                    Area (sq ft)
Area (sq ft)
Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
  E.G. Slope (ft/ft)
                              0.000267
                                                                                      21970 31
                                                                                                     10538 68
                                                                                                                     44549 96
                                    125000.00
  Q Total (cfs)
  Top Width (ft)
Vel Total (ft/s)
                                   10379.94
                                                                                        4438.96
                                                                                                        429.58
                                                                                                                       5511.40
                                                                                                           4.26
                                        34.76
                                                                                                         24.53
  Max Chl Doth (ft)
                                                                                            4.95
                                                                                                                           8.08
  Conv. Total (cfs)
Length Wtd. (ft)
                                    7646264.0
1720.03
                                                     Conv. (cfs)
Wetted Per. (ft)
                                                                                        929132.7
                                                                                                       2747507 0
                                                                                                                        3969624 0
                                                                                                                      5532.15
                                                                                        4441.88
                                                                                                        443.86
                                                    Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                           0.40
  Min Ch El (ft)
                                        61.64
                                                                                            0.08
                                                                                                                           0 13
                                         2.92
  Alpha
  Frctn Loss (ft)
                                                    Cum Volume (acre-ft)
                                         0.34
                                                                                      35001.95
                                                                                                     24884.95
                                                                                                                     58168.14
                                                     Cum SA (acres)
           Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note:

RIVER: Rio Grande REACH: Lower Reach RS: 137.43*

86.94 5668.83

5836.08

86.35 5941.01

TNPIIT Description: RGV-02, Station Elevation Data num= Sta 39.15 Elev 85.59 Sta Elev 24.82 48.69 82.21 85.94 86.58 86.5 93.98 97.43 79.99 111.03 224.74 100.96 79.18 129.31 263.96 97.82 78.41 165.93 284.96 86.35 187.44 79.25 295.95 82.15 210.91 78.9 81.87 320.95 476.15 79.27 85.77 305 95 77.86 346.42 78.12 358.69 372.85 81 76 777.72 85.54 863.61 85.42 919.29 85.65 972.14 85.64 1111.32 86.21 1157.1 86.39 1184.62 86.32 1222.44 1236.2 86.31 1294.67 86.45 1463.69 86.46 1514.78 1332.06 86.31 1366.89 86.29 1411.6 86.1 86.11 1556.06 86.31 1629.8 86.48 1738.33 1549.17 86.28 1576.69 85.99 1652.34 86.19 1589.05 86.1 1662.66 86.34 1598.46 86.5 1672.99 1614.13 86.61 1762.4 86.62 1910.29 1700.5 86.41 1748.65 86.48 1783.37 86.57 86.48 1872.45 86.84 86.9 1927.48 86.7 2061.62 1844.95 1972.19 86.58 2013.47 86.99 2037.55 86.91 2047.86 86.9 2075.37 86.84 2096.01 87.06 2120.08 88.8 2178.55 87.53 2137.27 89.11 2147.6 86.82 2219.82 2157.92 89.88 2171.67 88.67 2199.19 86.46 2240.45 2360.83 86.52 2247.34 86.57 2395.22 86.37 2288.6 86.48 2422.74 86.48 2347.07 86.77 2446.81 86.48 2357.9386.55103 86.53 2491.52 86.58 86.62 2605.01 87.26 2689.16 2549.98 86.93 2567.19 86.87 2632.53 86.67 2646.29 87.85 2698.55 2717 36 88 98 2726 76 86.82 2739.3 86.42 2869.83 86 33 2752 9 86.35 2780.42 86 1 86.26 2889.74 86.5 2921.08 86.25 3055.56 86.35 2849.2 86.46 2962.7 86.34 2990.04 2955.82 86.44 3034.92 86.53 3076.19 86.24 3093.38 86.18 3224.08 86.31 3124.34 86.17 3151.86 86.1 3255.02 86.31 3186.24 86.13 3279.1 86.31 3203.45 86.25 3234.39 86.52 3292.86 86.41 85.7 3375.62 85.63 3497.87 3313.5 85.7 3389.16 85.85 3420.12 85.71 85.62 3698.5

84.98 3767.47 84.7 3956.64

84.18 4097.64

84.13 4235.21

83.78 4334.85

89.36 4376.38 79.43 4436.84

84.7 84.71

83.88

84.64

85.76 3670.28

85.65 3742.38 84.77 3911.92

83.79 4221.46

83.69 4317.75

89.2 4369.33 80.45 4422.19

84.24

4077.8

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4386.95 84.54 4393.99

4492.65 79.13 4499.7

4541.98 78.01 4552.55

4608.15 72.7091 4617.79

4654.7268.56432 4657.55

4701.15 60.7 4722.66

474.22 59.78 4789.95
                                                                81.27 4475.04
79.29 4525.81
                                                                                         81.58 4482.08
79.04 4534.93
                                                                79.29 4525.81 79.04 4534.93
78.5 4587.79 74.51 4594.83
72.83 4642.26 72.19 4651.43
65.08 4675.9 61.17 4691.84
58.17 4744.81 58.17 4753.02
61.28 4816.9961.86948 4819.05
                                         79.01 4570.17
                                                                                                                 73.15
                                        72.39 4636.14
67.88 4672.84
                                                                                                                 61.01
                                        58.94 4734.81
                                                                                                                 59 32
                                        60.51 4812.95
                68.13 4833.68
86.53 4877.67
85.77 4952.63
86.85 5010.92
 4829.2
4873.93
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86.73 4888.87
                                                               72.216 4851.57
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                                                                                         79.09 4862.75
                                                                                                                 84.25
                                                                                         86.18 4922.49
                                        86.12 4955.54
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                                                                86.45 4975.94
86.42 5060.67
                                                                                         86.82 4981.77
86.26 5079.34
 4938.05
                                                                                                                 86.58
 5092.53
                85.99 5136.25
                                          85.8 5172.71
                                                                 85.84
                                                                          5185.9
                                                                                         85.68 5202.58
                                                                                                                 85.89
                85.52 5247.39
85.25 5407.98
                                        85.74 5262.33
85.13 5434.13
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                                                                80.73 6393.99
74.66 6483.55
                                                                                         78.66 6411.81
74.54 6498.5
                                        73.95 6566.42
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 6535.84
                74.05 6554.52
                                                                 74 85 6571 77
                                                                                         83.43 6586.39
                                                                                                                 83 86
 6595.16
                85.13 6609.78
                                                                 85.03 6639.02
                                                                                         85.04 6682.88
                                                                83.77 6789.79
84.57 6838.34
82.87 7013.85
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                                        83.82 6744.98
                                                                                         83.88
                                                                                                     6801
                                                                                                                 83.57
                                                                                         83.95 6871.96
   6919.7
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                                        82.96 6991.45
                                                                                         82.93 7044.49
                                                                                                                 82.83
 7080.14
7176.99
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                                        82.63 7140.75
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                                                                                         82.97 7171.15
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                                                                                                                 86.07
                                                                85.96 7410.9
86 7547.74
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85.99 7652.27
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                86.05 7340.73
85.93 7495.69
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                                                                84.82 8051.21
                85.07
                                        85.11 8039.51
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                          7999.5
                                                                                         84.96 8077.52
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8247.11
                                                                85 8194.47
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                                                                                        85.14 8226.64
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                84.92 8299.73
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84.99 8536.56
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                                                                                         84.88 8478.08
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84.27 8712.6
                                        84.68 8678.99
   8638.9
                84.86 8647.67
                                                                 84.71 8693.92
                                                                                                                 84.13
                84.17 8741.23
                                         84.47 8755.85
                                                                 84.47 8770.47
                                                                                         83.92 8788.01
                                                                 84.05 8977.68
                                                                                        84.46 9000.08
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 8802.63
                83.61 8888.07
                                        84.08 8929.14
                                                                                                                 85.02
                85.01 9068.7
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                                        85.19 9085.95
84.94 9194.22
                                                                85.04 9104.61
84.77 9246.49
                                                                                         84.86 9287.56
 9138.21
                                                                                                                 84.75
                                                                                         84.86 9440.63
85.13 9552.63
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 9332.36
9451.82
                84.72 9343.53
84.93 9474.22
                                        84.95 9377.16
84.98 9522.76
                                                                84.77 9433.16
85.24 9530.23
                                                                                                                 84 41
                                                                                                                 85.45
                85.23 9578.77
85.4 9731.84
84.2 9821.45
                                        85.37 9597.44
85.57 9750.51
84.1 9858.12
 9563 83
                                                                85 32 9642 24
                                                                                                                 85 61
                                                                84.97 9787.84
84.09 9875.66
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10056.94
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                                                                                         81.5310288.69
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10624.15
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83.8210698.82
                                                                                         83.8910548.14
83.7710711.87
                                         84.0110670.94
                                                                                                                 83.89
10773 49
                83 5610805 44
                                        83 5210820 05
                                                                83 8510822 98
                                                                                         84 2510834 67
                                                                                                                  88 4
                90.0610859.36
                                         93.2510866.83
                                                                 94.2410887.11
10848.16
                                                                                         92.6910891.16
                                        87.4410909.65
10899.27
                88.1110903.33
                                                                87.2710966.18
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                                                                                                                 88.19
10978.35
                90.6310992.54
                                         90.12 10996.6
                                                                 88.3611006.74
                                                                                         85.1511020.93
Manning's n Values
                                       n Val
      Sta n Val Sta
0 .066 111.03
9.27 .066
                                                       Sta
                                                                n Val
                                                                                         n Val
                                                                                                                n Val
                                                                   .07 4608.15
                                                                                           .025 4789.95
                                          .085 4369.33
                   Et Right Lengths: Left Channel Right
33 4873.93 1088.69 1566 1979.92
Station= 111.03 Elevation= 100.96
Bank Sta: Left Right
4369.33 4873.93
                                                                                          Coeff Contr.
                                                    Elevation= 100.96
                        Station=10866.83
Right Levee
                                                        Elevation= 94.235
| Blocked Obstructions | num= 2 |
| Sta L | Sta R | Elev | Sta L | Sta R |
| 48.19 | 4364.89 | 89.37 | 4888.12 | 10829.6
CROSS SECTION
RIVER: Rio Grande
                                      RS: 137.14
REACH: Lower Reach
Description: RGV-02, Updated on left with new survey to Station 1118.49.
                   Bathymetric elevations translated from IBWC 2008 Cross-sections ation Data num= 440
Station Elevation Data
       Sta
0
                Elev
86.72
                            Sta
25.84
                                       Elev
85.51
                                                    Sta
40.75
                                                                87.18
                                                                           50.69
                                                                                         86.47
                                                                                                   77.59
                96.24
81.78
                          95.58
231.57
                                                                          159.58
271.57
                                                                                        86.93 171.58
78.13 298.56
                                                                                                                 83.48
78.46
    85.58
                                       100.22
                                                  115.58
                                                               100.79
                                                   254.57
                                                                 78.66
   311.56
                80.69
                           320.56
                                        84.55
                                                   326.56
                                                                85.57
                                                                           346.56
                                                                                          85.7
                                                                                                   361.56
                                                                                                                 85.59
                                                                                        85.26 755.52
86.28 1118.49
                           509.55
                                         85.27
                                                   560.54
                                                                           678.53
                           905.51
                                        85.73
                                                                           1063.5
   846.51
                85.31
                                                    961.5
                                                                85.65
                                                                                                                 86.88
 1123.97
                86.62 1160.05
86.79 1363.45
                                        86.66 1173.17
86.47 1379.86
                                                                86.49 1228.95
86.59 1412.66
                                                                                         86.3 1297.84
85.98 1438.91
 1471.71
                85.71 1478.28
                                        86.05 1497.96
                                                                85.81 1520.92
                                                                                         86.12 1540.61
                                                                                                                 85.71
                85.79 1579.97
                                         86.47 1589.82
                                                                                         86.45 1652.15
                                                                  85.9 1616.06
 1661.99
                86.64 1675.11
                                        86.36 1717.76
                                                                 86.52 1734.17
                                                                                         86.28 1753.85
                                        86.9 1786.66
87.12 1842.43
                                                                86.52 1799.78
86.6 1848.99
                                                                                         86.48 1816.18
86.75 1875.23
                  86.8 1832.58
 1826.02
                                                                                                                 86.38
  1914.6
1973.65
                87.2 1921.16
86.79 1993.34
                                        86.91 1937.57
87.18 2016.3
                                                                87.02 1947.41
88.12 2032.7
                                                                                         86.57 1960.53
91.32 2042.55
 2052.39
                92.81 2065.51
                                         90.66 2072.07
                                                                 90.39 2085.19
                                                                                         88.21 2091.76
                                                                                                                 86.71
                                         86.03 2137.69
 2245 95
                85 97 2278 75
                                        85 89
                                                     2305
                                                                86.49 2327.96
86.68 2442.79
                                                                                         86.01 2370.61
                                                                                                                 86 04
                                                                                         86.1 2478.87
86.27 2560.89
                                                                    86 2554.33
 2505.12
                86.09 2518.24
                                        86.37 2531.36
                                                                                                                 86.09
   2610.1
                86.18 2619.94
86.53 2754.45
                                        86.44 2646.19
86.97 2770.85
                                                                86.13 2669.15
86.75 2813.5
                                                                                         86.58 2711.8
87.08 2820.06
 2731.48
                                                                                                                 86.85
                                                                 87.28 2928.32
                                        86.77 2908.64
86.97 3033.3
                                                                                         86.68 2944.72
 2869.27
                87.04 2888.95
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85.8 3609.27

83.31 3720.44

84.69 3860.34

84.56 4042.61

84.07 4176.74

88.61 4353.66 82.49 4408.09

79.37 4471.52

83.25 3711.03

84.52 4008.22

83.91 4166.43

85.57 4350.52 84.54 4393.99

85.98 4278.5584.39748 4290.24

3707.89

4142.35

4386.95

4252.4

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3223.58
3367.93
                 86.09 3226.86
                                          86.22 3256.39
                                                                   85.99 3299.03
                                                                                           86.19 3315.44
86.22 3436.82
                                                                                                                    86.02
                                                                  86 3423.7
86.15 3587.73
86.25 3732.08
 3482.75
                 86.29 3515.56
                                          86.01 3577.89
                                                                                            85.96 3613.98
                                                                                                                    86.26
 3643.5
3768.17
                 86.05 3676.31
                                          86.23 3725.52
                                                                                            86.47 3758.33
                                                                                                                      86.1
                 86.24 3787.85
                                          85.94 3817.38
                                                                   86.08 3850.18
                                                                                           85.46 3886.27
                                                                                                                    85.23
                                         84.95 3945.32
88.74 4050.3
84.82 4145.44
                                                                                           85.46 3886.27
85.13 3978.13
86 4086.39
87.3 4171.69
80.47 4250.42
                 84.79 3925.64
85.32 4033.9
                                                                  84.74 3968.29
89.04 4073.27
  3902.67
  4020.78
                                                                                                                    84.62
                 84.44 4112.63
 4092.95
                                                                   87 4161.84
83.62 4234.02
                                                                                                                      86.7
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70.94 4486.38
55.1 4552.65
56.5 4662.65
                  80.5 4316.04
                                                                  80.22 4339
80.87 4407.89
73.81 4470.03
57.2 4539.65
 4263.55
                                          79.87 4329.16
                                                                                                                    80.13
                                         79.87 4329.16
80.55 4394.77
79.37 4463.49
57.71 4516.65
56.1 4618.65
                 79.99 4378.37
80.58 4453.68
65.35 4489.65
 4447.14
                                                                                                                    65.52
  4489.65
                                                                                                                      54 7
 4564.65
                  56.5 4595.65
                                                                    56.6 4640.15
                                                                                                                      57.5
                                         56.1 4618.65
65.35 4682.59
81.63 4725.1
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86.45 4862.44
85.1 4934.38
83.6 5091.45
83.18 5183.3
82.69 5324.35
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82.19 5620.53
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79.37 4715.29
86.7 4764.34
85.86 4855.9
85.13 4924.57
 4676.05
                                                                  66.27 4689.13
86.02 4734.91
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86.01 4741.45
  4708.75
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86.42 4885.33
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85.96 4875.52
 4747.99
 4895.14
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                                                                                           84.45
                                                                                                     4986.7
                                                                                                                         84
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83.05 5160.33
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82.77 5212.82
                                                                                           83.38 5117.69
82.93 5232.5
 5035.75
                                                                                                                    83 17
 5153.77
                                                                  82.59 5344.03
82.73 5485.08
81.76 5660.53
                                                                                           82.78 5399.79
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82.42 5449
   5265 3
  5406.35
                 82.42 5449
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                                         82.19 5620.53
79.63 5860.53
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82.02 6075.53
 5560.53
                                                                                                                    80.19
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63.85 6526.83
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                                                                                           83.23 6249.38
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71.62 6466.83
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86.63 6688.93
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                 63.26 6626.83
                                                                   64.86 6646.29
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 6672.53
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                                                                                           83.18 6902.15
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81.86 7276.64
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88.52 7413.87
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                                                                                                                    88.89
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88 7781.26
                                                                   88.49 7558.2
88.01 7663.17
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                 88.67
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                                                                                                                      88 2
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87.26 8584.92
                                                                  87.44 8502.92
87.07 8650.53
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 8424 19
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 8680 05
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                                                                                                                    86.91
                 87.17 8801.42
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85 9113.05
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84.84 9096.65
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83.78 9132.73
 9080.25
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86.11 9424.67
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                 83.46 9218.02
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85.7210333.31
                                          85.8310159.46
                                                                   85.6910198.82
                                                                                            85.7310231.62
                                                                  85.8810415.32
85.2910513.73
80.6610696.37
10287.39
                                           85.710352.99
                                                                                            85.8510425.16
                                                                                                                      85.7
                   85.810497.32
                                         84.9610507.17
80.5310636.37
                                                                                           85.0210546.53
80.810756.37
10556.37
                   80.410616.37
                                                                                                                    80.83
10796 37
                 80.5710816.37
                                          79 9710856 37
                                                                   80 6310989 37
                                                                                            82.4811018.89
                                                                                                                    83 25
                 83.4211051.69
                                                                                            84.2311163.22
                                          84.0411107.46
                                                                   84.44 11117.3
11205.86
                 83.94 11215.7
                                          84.0111245.23
                                                                  83.6611291.15
                                                                                           83.6511317.39
                                                                                                                    83.33
                                                                    84.511428.92
                                                                                            92.2511435.48
                93.6511468.29
                                         92.9511478.13
                                                                  87.7211481.41
    11465
                                                                                           87.2711524.05
Manning's n Values
                              Sta n Val Sta
45.95 .085 4161.84
     Sta n Val Sta
0 .066 2245.95
                                                                                          n Val
                                                                                                                    n Val
                                                                 n Val
                                                                     .07 4489.65
                                                                                            .025 4676.05
 4741.45
                 .066
Bank Sta: Left
                          Right
                                        Lengths: Left Channel
                                                                             Right
                                                                                            Coeff Contr.
                                                                                                                    Expan.
                                         1159.96 1152.38 1315.88
2
          4161.84 4741.45
Heffective Flow num= Sta L Sta R Elev Permanent 0 4161.84 87.3 T
                           86.89
 4741.4511524.05
Left Levee Station= 115.58
Right Levee Station= 11465
                                                           Elevation= 100.79
                                                          Elevation=
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                  Left OB Channel
   E.G. Elev (ft)
                                                           Element
                                                                                                                                    Right OB
                                                          Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                0.074
1159.96
34221.21
                                                                                                                  0.057
1152.38
                                              0.03
                                             82.69
                                                                                                                 13730.30
                                                                                                                                   59614.19
                                  0.000120
125000.00
11392.94
                                                                                                                 13730.30
                                                                                                                                   80406.61
   E.G. Slope
                                                                                                  31263.97
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                        125000.00
                                                            Flow (cfs)
                                                                                                                  31389.09
                                                                                                                                    62346.94
                                                          Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                  4030.73
                                                                                                                    579.61
                                                                                                                                    6782.60
                                                                                                                      2.29
                                                          Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                             41 20
                                                                                                      8 49
                                                                                                                     23 69
                                                                                                                                         8 79
                                                                                                    2858093.0
                                                                                                                      2869532.0
                                                                                                                   603.39
                                                                                                                                    6812.09
                                         1246.54
                                                                                                  4036.07
   Min Ch El (ft)
                                             54.70
                                                                                                                       0.17
   Alpha
                                              1.53
                                                                                                      0.06
                                                                                                                       0.39
                                                                                                                                         0.07
   Frctn Loss (ft)
C & E Loss (ft)
                                              0 15
                                                          Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                33517.38
                                                                                                                 24016.14
1199.74
                                                                                                  7296.92
                                              0.00
Warning: The cross-section end points had to be extended vertically for the computed water surface.
```

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach

86.64 3098.91

Description: RGV-02, New Cross-section, End Wall, Updated on left with new survey to Station 1045.88. Bathymetric elevations translated from IBWC 2008 135 Cross-section

| Station Eleva
Sta E | Elev Sta | num= 43
Elev | Sta Elev | | Elev | Sta | Elev | |
|---|-----------------------------------|---------------------------------------|--------------------------|----------------------|--------------------|--------------------|----------------------|----------------------|
| | 0.83 50
5.65 200.98 | 100.69
87.89 227 | 59 98.59
.98 82.18 | | | 110.99
370.96 | 92.36
80.08 | |
| 383.96 82 | 2.21 430.95 | 83.01 465 | .95 84.46 | 472.95 | 87.58 | 491.95 | 87.18 | |
| 935.89 | 1.81 900.9
70 942.89 | 72.94 945 | 3.9 69.63
.89 84.57 | 954.89 | 68.99
86.41 | 957.89 | 71.42
75.6 | |
| | 5.68 1000.89
1.96 1072.34 | 67.06 1012
85.19 1108 | | 1025.88
1147.76 | 67.37 1
85.1 1 | | 68.07
85.26 | |
| | 5.07 1233.02
5.27 1396.99 | | .98 85.11
.34 85.29 | | 85.29 1
85.47 1 | | 85.19
85.32 | |
| 1541.28 85 | 5.47 1597.03 | 85.39 1616 | .71 85.56 | 1665.9 | 85.6 1 | L695.41 | 85.48 | |
| 1918.41 85 | 5.52 1741.32
5.69 1941.36 | 85.71 1790
85.84 1964 | .32 85.76 | 1800.35
1993.83 | 85.74 1
86.22 2 | 2039.74 | 85.52
86.06 | |
| | 5.51 2085.65
3.43 2187.31 | 86.34 2108
83.66 2200 | .61 83.93
.43 83.53 | 2125.01 2236.5 | 83.75
83.56 2 | | 83.84
83.31 | |
| 2282.41 83 | 3.63 2341.44 | 83.45 2351 | .28 83.66 | 2374.23 | 83.5 2 | 2380.79 | 83.79 | |
| 2620.18 83 | 3.45 2466.05
3.67 2623.46 | 83.49 2646 | .12 83.48
.41 83.73 | 2666.09 | | 2692.32 | 83.48
83.69 | |
| | 3.54 2721.83
3.81 2879.24 | 83.7 2777
83.65 2895 | .58 83.61
.64 83.82 | 2784.14
2912.03 | 83.88 2
83.67 2 | | 83.54
83.7 | |
| 2948.11 84 | 1.06 2954.66
3.79 3135.02 | 83.75 3020 | .25 83.64
.86 83.87 | 3089.11 | 83.83 3
83.72 3 | 3098.95 | 83.63
83.93 | |
| 3305.55 | 84 3328.5 | 83.86 3338 | .34 84.04 | 3380.97 | 84.13 3 | 3413.76 | 83.94 | |
| | 1.18 3538.38
1.33 3636.75 | 84.03 3554
84.13 3653 | | | 84.31 3
84.08 3 | | 84.1
84.32 | |
| | 1.14 3751.53
3.26 3813.83 | 84.22 377
88 53 3823 | 1.2 84.66
.67 87.29 | | 88.26 3
87.74 3 | | 88.72
82.39 | |
| 3872.86 76 | 5.41 3895.82 | 66.4 3899 | .09 65.58 | | 63.64 3 | 3912.65 | 60.24 | |
| | 9.64 3942.65
9.64 4002.65 | 60.14 3962
59.64 4012 | .65 59.84
.65 59.14 | 4022.65 | 59.24 3
59.34 4 | | 59.14
58.44 | |
| | 3.64 4070
5.98 4108.97 | | .18 65.32
.81 79.41 | | 65.41 4
81.16 4 | | 67.58
79.94 | |
| 4145.04 80 | 0.01 4151.6 | 81.29 4161 | .44 81.9 | 4181.11 | 81.55 4 | 1197.51 | 82.77 | |
| 4292.61 83 | 2.69 4227.02
3.55 4302.45 | 82.37 4243
84.1 432 | 5.4 84.33 | 4253.26
4377.87 | 82.88 4
84.44 4 | 1390.99 | 82.94
84.32 | |
| | 1.75 4456.57
3.52 4610.7 | 85.1 4489
83.47 462 | .37 84.47 | 4528.72 | 84.09 4
82.87 4 | 1538.56 | 84.11
82.91 | |
| 4709.08 82 | 2.52 4728.76 | 82.6 4774 | .67 82.32 | 4784.5 | 82.4 4 | 1873.05 | 81.89 | |
| | 1.95 4932.07
1.56 5115.75 | 81.65 4964
81.96 5122 | | | 81.33 5
82.17 5 | | 81.33
82.38 | |
| | 2.32 5227.29
2.71 5378.19 | 82.15 5289
82.92 5388 | .62 82.41 | 5312.58 | 82.61
83.01 5 | | 82.98
83.87 | |
| 5424.12 83 | 3.83 5437.24 | 84.3 544 | 3.8 84.03 | 5404.43
5460.2 | 84.04 5 | 5470.04 | 83.7 | |
| | 34.1 5499.57
0.63 5555.34 | 84.55 5509
89.79 5565 | .41 85.45
.18 86.57 | 5519.25
5575.02 | 86.8 5
84.28 5 | | 89.92
83.46 | |
| 5604.54 82 | 2.02 7031.57 | 82.02 7038 | .13 82.27 | 7041.41 | 83.42 7 | 7051.25 | 83.96 | |
| 7143.1 86 | 5.34 7074.21
5.13 7166.07 | 85.81 7175 | | 7248.08 | 86.08 7
86.34 | 7261.2 | 86.01
86.47 | |
| | 36.4 7326.81
7.41 7494.12 | 86.74 7336
87.47 7503 | | 7372.74
7579.41 | 87.17 7
87.2 7 | | 87.17
87.3 | |
| 7615.5 | 37.1 7638.46 | 87.17 764 | 8.3 87.47 | 7661.42 | 86.94 7 | 7667.98 | 87.11 | |
| 7818.89 87 | 37.3 7730.31
7.35 7832.01 | 86.85 7756
87.13 7874 | .66 87.18 | 7772.96
7881.22 | 86.8 7
86.97 7 | | 86.87
87.27 | |
| | 7.03 7992.75
5.79 8101.01 | 87.21 8005
87.45 813 | | 8015.72
8153.5 | 87.34 8 | 3064.93
3196.15 | 87.2
86.61 | |
| 8225.67 86 | 5.96 8248.63 | 86.74 8261 | .75 86.98 | 8274.87 | 86.53 8 | 3284.71 | 86.7 | |
| | 5.38 8324.08
7.16 8422.49 | 86.37 8350
87.19 8432 | .32 86.86
.33 86.91 | 8360.16
8481.54 | 86.78 8
86.7 8 | | 87.34
86.58 | |
| | 5.69 8530.74
7.16 8638.99 | 86.56 8583
87.7 8655 | | 8593.07
8661.95 | 87.12 8
87.39 | 8612.75 | 87.47
87.67 | |
| 8684.92 87 | 7.53 8694.76 | 87.88 8711 | .16 87.85 | 8721 | 87.44 | 8737.4 | 87.73 | |
| | 7.54 8789.89
7.16 8904.7 | 86.92 8806
87.24 893 | 7.5 86.81 | 8832.53
8976.87 | 86.98 8
86.8 8 | 3996.55 | 86.89
86.52 | |
| | 5.94 9039.19
5.61 9180.25 | 87.24 893
86.37 9052
85.8 9206 | .31 86.17
49 85 56 | 9088.4 | 86.04 9
85.55 9 | 9127.76 | 86.31
85.82 | |
| 9268.82 85 | 5.62 9278.66 | 85.89 9298 | .34 85.64 | 9340.99 | 86.17 9 | 360.67 | 85.96 | |
| | | 85.06 9498 | | 9432.84
9514.84 | 85.46 9
85.12 9 | | 85.03
85.39 | |
| | 1.85 9570.61
5.91 9708.38 | 84.52 960
87.69 9718 | 6.7 84.47 | 9646.06 | | | | |
| 9790.39 86 | 5.09 9823.2
5.0110065.94 | 86.36 9859 | .28 86.23 | 9882.24 | 86.3410 | 0000.34 | 86.1 | |
| 10023.3 86
10200.44 85 | 5.0110065.94
5.6910226.68 | 86.0510095
85.4210233 | .47 85.91
.24 85.55 | 10138.11
10262.76 | 85.910
85.3210 | 0187.32 | 85.63
85.45 | |
| 10305.41 85
10535.03 84 | 5.1510367.73 | 84.96 1040 | 7.1 84.56 | 10430.06 | 84.7910 | 0462.87 | 84.4 | |
| 10699.05 82 | 2.4810722.01 | 82.4810738 | .41 82.99 | 10754.82 | 82.4811 | 1155.02 | 82.48 | |
| 11168.14 83
11217.35 88
11335.44 88 | 3.0911177.98
3.4711223.91 | 86.211184
88.5511243
87.8511387 | .54 87.42
.59 87.61 | 11197.66
11259.99 | 88.15 1
88.0411 | L1207.5
L309.19 | 89.23
88.15 | |
| 11335.44 88 | 3.3111345.28 | 87.8511387 | .92 88.07 | 11430.57 | 88.0211 | 1499.46 | 88.06 | |
| 11509.3 87
11627.39 88 | 3.5711640.51 | 88.2511686 | .44 88.42 | 11709.4 | 89.211 | L768.44 | 88.15 | |
| 11778.28 88
11899.66 88 | 1911935 74 | 87 8811945 | 58 87 93 | 11991 51 | 87 4612 | 2011 19 | 87 48 | |
| 12024.31 8
12119.44 87
12165.37 93
12296.58 87 | 37.112043.99 | 86.9812073 | .52 85.46 | 12093.2 | 85.4212 | 2103.04 | 86.8 | |
| 12119.44 87 | 3.3512168.65 | 91.0912175 | .21 88.09 | 12181.77 | 87.2712 | 2290.02 | 87.27 | |
| 12296.58 87
12352.35 94 | 7.5312303.14
1.9212362.19 | 88.9112312
94.1512368 | .98 94.16
.75 91.94 | 12316.26
12385.15 | 94.8612
90.04 | 2342.51 | 94.64 | |
| Manning's n V | Zalues | num= | 5 | | | | | |
| Sta n | Val Sta
.101 3797.44 | n Val | Sta n Val | Sta | n Val | Sta | n Val | |
| · · · | | .006 3895 | .02 .015 | -1.00.UI | .066 4 | 1450.5/ | .0/4 | |
| Bank Sta: Lef
3797.4 | t Right
14 4302.45 | Lengths: Le
6010. | tt Channel
21 5782.22 | Right
1539.14 | Coeff | Contr. | Expan. | |
| Left Levee | Station= | 2162 00 | Elevation= | 100.83 | | | - | |
| Blocked Obstr | station=1
ructions | 2102.09
num= 3 | Lievallon= | 74.31 | | | | |
| Bank Sta: Lef
3797.4
Left Levee
Right Levee
Blocked Obstr
Sta L St
39.44 3785 | a R Elev
5.92 88.24 | Sta L St
4487.8911223 | a R Elev
.66 84.57 | Sta L
11223.6612 | Sta R
154.37 | Elev
88.49 | | |
| CROSS SECTION | | | | | | | | |
| | | | | | Te | eft. OR | Channel | Right ∩R |
| Vel Head (f | t) | 0.03 | Wt. n-Val. | (5.) | 0 | 0.101 | 0.050 | 0.074 |
| w.s. Elev (
Crit W.S. (| , _ t)
(ft) | 95.75
87.85 | кеасп Len.
Flow Area | (IT)
(sq ft) | 601
2763 | 10.21
37.38 | 5/82.22 | 1539.14
78592.23 |
| E.G. Slope | (ft/ft) | 0.000121
125000 00 | Area (sq f | t)
) | 2763
171 | 37.38
L03.61 | 11234.98
28510 21 | 78592.23
79386 19 |
| Top Width (| ft) ft) ft) ft) fts) ft/ft) ft/s) | 12292.47 | Top Width | (ft) | 370 | 04.76 | 505.01 | 8082.70 |
| ver local (| 10/0/ | 1.00 | Avg. VEI. | (10/0/ | | 0.02 | 2.34 | 1.01 |
| | | | | | | | | |

```
Max Chl Dpth (ft)
                                                   Hydr. Depth (ft)
                                                                                                                           9.72
7204553.0
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                                       2587394.0
516.06 8
0.17
0.42
                                 11344150.0
                                                   Conv. (cfs)
Wetted Per. (ft)
                                                                                        1552208.0
                                                                                       3705.34
0.06
0.03
                                                                                                                      8095.49
                                     58.44
1.92
                                                   Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                          0.07
Alpha
Frctn Loss (ft)
C & E Loss (ft)
                                                   Cum Volume (acre-ft)
                                                                                                                     50309.76
                                       0.51
                                                                                     32618.90
                                                                                                     23685.91
                                      0.00
                                                                                                      1185.39
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande RS: 136.2 REACH: Lower Reach

Description: RGV-02, New Cross-section, Begin Wall, Updated on left with new

| Descripti | surv | rey to St | tation 17 | 755.99. I | | | | ranslated | |
|------------------------|------------------|----------------------|-------------------|----------------------|--------------------|----------------------|----------------|----------------------|----------------|
| Station E | | | 35 Cross-
num= | section- | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | | Elev |
| 0
217 | 92.6
88.29 | 25
253 | 97.22
97.81 | 68
276 | 97.23
99.97 | 111
314 | 91.63
100.3 | | 88.29
97.48 |
| 391 | 86.2 | 501.01 | 85.82 | 593.01 | 85.13 | 824.01 | 85.67 | 848.01 | 85.22 |
| 1031.01
1258.25 | 85.51
83.75 | 1082.01
1264.8 | | 1241.87
1277.91 | | 1248.42
1284.46 | 86.7
80.82 | | 84.58
65.63 |
| 1502 | 64.41 | 1525 | 76.47 | 1549 | 72.42 | 1569 | 74.58 | | 79.91 |
| 1675.99 | 80.91 | 1755.99 | 79.59 | 1843.99 | 82.1 | 2027.98 | 82.66 | 2222.93 | 82.07 |
| 2225.08 2320.19 | 82.33
81.68 | 2264.44 2333.3 | | 2280.83
2375.94 | | 2297.23
2385.78 | | 2307.07
2392.34 | 82.03
84.56 |
| 2398.89 | 85.56 | 2405.45 | 85.4 | 2428.41 | 86.91 | 2454.65 | 88.02 | 2461.21 | 88.91 |
| 2467.76
2608.78 | | 2474.32
2667.81 | | 2490.72
2746.52 | 86.64 | 2526.8
2762.92 | | 2585.83
2795.71 | 86.24
86.97 |
| 2831.79 | | 2858.03 | | 2900.66 | | 2920.34 | | 2953.13 | 86.53 |
| 2995.76 | | 3018.72 | | 3028.56 | | 3061.35 | | 3084.31 | 86.29 |
| 3117.11
3333.55 | | 3146.62
3379.47 | | 3205.65
3451.62 | | 3271.24
3468.01 | | 3304.04
3490.97 | 85.83
85.35 |
| 3513.93 | 85.78 | 3658.22 | 86.47 | 3671.34 | 86.32 | 3730.37 | 86.34 | 3786.12 | 85.83 |
| 3818.92
3917.31 | | 3832.04
3959.94 | | 3851.71
3976.34 | | 3864.83
3989.45 | | 3881.23
4012.42 | 86.9
86.73 |
| 4041.94 | | 4068.18 | | 4107.55 | | 4123.95 | | 4251.88 | 85.6 |
| 4271.56 | | 4343.73 | | 4363.42 | | 4376.54 | | 4406.06 | 85.78 |
| 4448.71
4707.85 | 85.64
86.23 | 4550.4
4757.06 | | 4596.32
4789.86 | | 4635.69
4825.95 | | 4668.49
4848.91 | 85.56
86.11 |
| 4881.71 | 86.16 | 4904.68 | 85.95 | 4950.6 | 86.03 | 5003.09 | 86.43 | 5019.49 | 86.26 |
| 5049.01
5111.34 | 86.8
81.93 | 5068.7
5117.9 | | 5078.54
5137.58 | | 5088.38
5564.03 | 85.93
81 33 | 5101.5
5583.72 | 82.74
82.11 |
| 5606.68 | | 5659.16 | 83.2 | 5669 | | 5711.65 | | 5754.29 | 81.33 |
| 6436.61
6538.3 | | 6462.86
6564.55 | | 6479.26
6577.67 | | 6495.66
6646.56 | | 6518.62 | 83.85
86.72 |
| 6738.41 | | 6761.37 | | 6771.21 | | 6777.77 | | 6676.08
6800.73 | 87.7 |
| 6840.1 | | 6846.66 | 88.04 | 6856.5 | | 6876.18 | 87.7 | 6889.31 | 87.43 |
| 6922.11
7086.13 | | 6961.47
7112.37 | | 6981.16
7155.02 | | 7017.24
7161.58 | | 7046.76
7276.39 | 87.82
87.22 |
| 7279.67 | | 7368.24 | 87.53 | 7407.6 | | 7463.37 | | 7483.05 | 88.04 |
| 7535.54
7663.47 | | 7578.18
7679.88 | 88.01
87.85 | 7620.83
7693 | | 7627.39
7748.76 | | 7653.63
7761.89 | 88.32
87.59 |
| 7814.37 | | 7853.74 | | 7902.94 | | 8001.35 | | 8021.03 | 88.02 |
| 8135.85 | | 8194.89 | 87.66 | 8227.7 | | 8290.02 | | 8326.11 | 87.42 |
| 8372.03
8499.96 | | 8394.99
8627.89 | | 8417.95
8700.06 | 90.49 | 8431.07
8726.3 | | 8457.32
8778.78 | 91.98
89.18 |
| 8805.03 | 88.72 | 8847.67 | 88.33 | 8864.07 | 87.88 | 8929.68 | 86.77 | 8972.32 | 85.85 |
| 8992
9205.22 | | 9057.61
9238.02 | | 9123.21
9303.63 | | 9136.33
9372.51 | | 9165.86
9415.16 | 85.75
86.29 |
| 9444.68 | | 9477.48 | | 9497.16 | | 9595.57 | | 9648.06 | 87.08 |
| 9664.46 | 87.61 | 9690.7 | | 9700.54 | | 9713.66 | | 9746.46 | 87.57 |
| 9766.15
9917.04 | | 9792.39
9943.28 | | 9808.79
9966.24 | 87.5 | 9835.03
9992.48 | | 9877.67
10038.41 | 88
87.35 |
| 10074.49 | 87.311 | 10081.05 | 87.491 | 10117.13 | 87.21 | 10133.54 | 87.44 | 10163.06 | 87.04 |
| 10192.58
10336.91 | | L0228.66
L0363.16 | | L0235.22
L0376.28 | | 10284.43 | | 10310.67
10468.12 | 86.77
85.95 |
| 10477.96 | | 10517.33 | | 10523.89 | 86.51 | 0553.41 | 86.2 | 10579.65 | 85.3 |
| 10609.18 | | 10619.02 | | 10651.82 | | 10671.5 | | 10681.34 | 85.46 |
| 10727.27
10832.23 | | L0746.95
L0868.32 | | L0756.79
L0881.44 | | 10773.19
10901.12 | | 10815.83 | 84.68
85.13 |
| 10947.04 | | 10966.73 | | 10992.97 | | 1058.57 | | 11084.82 | 84.61 |
| 11101.22 | | L1140.58 | | 11160.26
11271.79 | 85.83
86.24 | 11170.1 | | 11183.22
11337.4 | 86.05
87.17 |
| 11347.24 | | 11373.48 | | 11386.6 | 87.011 | 1429.24 | | 11468.61 | 87.22 |
| 11478.45
11744.15 | | L1544.05
L1816.32 | | 11560.46
11904.88 | | 11668.7 | | 11678.54
11977.05 | 87.21
88.03 |
| 12013.13 | | 12075.46 | | 12101.7 | | 2167.31 | | 12206.67 | 87.54 |
| 12246.03 | | 12291.96 | | 12314.92 | | 2321.48 | | 12337.88 | 87.21 |
| 12357.56
12439.57 | | L2377.24
L2498.61 | | 12390.36
12518.29 | | 2400.21
2541.26 | | 12423.17
12570.78 | 87.41
86.45 |
| 12619.98 | 87.051 | 12626.54 | 87.491 | 2642.95 | 87.481 | 2652.79 | 87.95 | 12672.47 | 89.62 |
| 12685.59
12849.6 | 91.971 | 12966 | 95.071 | 12738.07 | 100.011 | | 100.76 | 12767.6
12921.77 | 102.1
97.25 |
| 12948.01 | 93.981 | 12000 | 91.91 | 12997.21 | 89.421 | 3010.34 | 88.87 | 13039.86 | 88.53 |
| 13075.94 | | | | | | | 85.76 | 13144.83 | 86.58 |
| 13180.91
13272.76 | | | | | | | | 13256.36
13308.84 | |
| 13430.21 | 87.271 | 13443.33 | 88.381 | 13453.17 | 93.931 | 3456.45 | 94.21 | 13489.26 | |
| 13508.94 | 90.741 | 13518.78 | 85.431 | 13525.34 | 83.18 | 13531.9 | 82.9 | | |
| Manning's | n Value | es | num= | 5 | | | | | |
| Sta
0 | n Val | Sta
1241 87 | n Val
.066 | Sta
1307 4 | n Val | Sta
1502 | n Val | Sta
2461.21 | n Val
.074 |
| | | | | | | | | | |
| Bank Sta: | Left
41.87 24 | | Lengths | | Channel
2469.54 | | Coef | f Contr. | Expan. |
| Left Leve | e 5 | Station= | 314 | Ele | | 100.3 | | . ± | |
| Right Lev
Blocked C | ree S | Station= | 12849.6 | | evation= | 105.6 | | | |
| Sta L | Sta R | Elev | Sta L
2468.731 | | Elev | | | | |
| 276.06 | 1230.42 | 88.8 | 2468.731 | 12927.32 | 88.29 | | | | |

| E.G. Elev (ft) | 95.27 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|----------|-----------|-----------|
| Vel Head (ft) | 0.04 | Wt. n-Val. | 0.101 | 0.060 | 0.074 |
| W.S. Elev (ft) | 95.23 | Reach Len. (ft) | 2472.19 | 2469.54 | 881.50 |
| Crit W.S. (ft) | 85.41 | Flow Area (sq ft) | 5678.98 | 20094.38 | 69840.43 |
| E.G. Slope (ft/ft) | 0.000214 | Area (sq ft) | 5678.98 | 20094.38 | 69840.43 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 4168.45 | 47116.64 | 73714.91 |
| Top Width (ft) | 12368.16 | Top Width (ft) | 900.51 | 1219.34 | 10248.31 |
| Vel Total (ft/s) | 1.31 | Avg. Vel. (ft/s) | 0.73 | 2.34 | 1.06 |
| Max Chl Dpth (ft) | 30.82 | Hydr. Depth (ft) | 6.31 | 16.48 | 6.81 |
| Conv. Total (cfs) | 8547372.0 | Conv. (cfs) | 285034.3 | 3221788.0 | 5040550.0 |
| Length Wtd. (ft) | 1559.16 | Wetted Per. (ft) | 901.24 | 1230.87 | 10249.34 |
| Min Ch El (ft) | 64.41 | Shear (lb/sq ft) | 0.08 | 0.22 | 0.09 |
| Alpha | 1.61 | Stream Power (lb/ft s) | 0.06 | 0.51 | 0.10 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 30320.48 | 21606.56 | 47687.41 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 6876.22 | 1070.94 | 7367.94 |
| | | | | | |

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 136

Description: RGV-02, Updated on left with new survey to Station 960.8. New Cross-section, End Wall, Bathymetric elevations translated from IBWC 2008 135 Cross-section

| Station Elevation Data State S | | | 2008 13 | | | | | | | |
|--|----------|---------|---------|--------|----------|--------|----------|-------|----------|-------|
| 0 108.08 31.99 87.52 34.99 86.44 11.98 87.47 113.97 92.32 124.97 98.45 13.96 94.41 169.96 88.2 189.96 82.2 39.96 92.3 34.20 95 87.57 223.95 86.77 260.94 85.96 28.94 86.76 326.93 86.23 189.96 87.57 223.95 87.79 26.04 85.96 28.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.76 326.93 86.27 260.94 86.47 25 99.54 674.72 99.64 634.72 99.87 274.72 99.64 634.72 60.04 664.72 59.34 674.72 99.64 634.72 69.95 88.94 88.98 18.17 33.07 913.81 74.7 938.8 78.35 96.88 22.25 974.37 82.99 1.78 28.24 18.18 28.24 18.18 28.24 18.18 28.24 18.18 28.24 18.18 28.24 18.18 28.24 18 | | | | num= | 430 | Flore | Cto | Flore | C+ n | Flore |
| 124, 97 90. 88 147.97 86.75 123.95 86.7 20.94 85.96 280.94 85.96 82.82 189.96 92.34 335.92 86.67 377.92 86.7 26.94 85.96 280.94 86.76 326.93 86.22 335.92 86.67 377.92 86.7 27.82 81.41 459.9 81.56 495.9 7.73 26.35 3529.89 64.33 541.32 66.85 547.88 65.46 557.72 66.04 654.72 60.64 554.71 66.04 54.72 60.64 614.72 60.24 624.72 59.64 634.72 59.64 3744.72 60.04 54.72 60.64 614.72 60.24 624.72 59.64 634.72 59.64 389.81 62 92.34 734.72 61.04 74.72 64.08 793.93 64.62 64.64 804.72 59.84 3891.81 73.07 913.81 74.7 938.8 78.35 960.8 82.2 594.37 82.24 3990.78 82.31 1017.02 82.12 1072.8 83.2 1092.48 84.06 1108.88 44.84 96.1161.38 84.98 1204.0 38 5.48 1233.55 85.56 1256.58 88.45 1286.04 85.97 1305.73 86.26 1361.5 86.28 1381.19 86.48 1407.43 86.18 1343.84 86.45 1499.2 887.74 86.65 1580.74 86.66 1521.42 86.55 1545.22 86.65 1588.38 86.81 1577.47 86.65 1580.74 86.86 1607.15 86.28 1381.19 86.48 1407.43 86.61 1578.28 86.12 2007.81 86.22 2020.93 86.14 1942.19 86.64 1186.12 1951.88 86.51 1578.43 86.54 1580.77 86.66 2351.88 85.75 2378.52 85.62 2608.05 86.22 2239.94 87.82 86.04 2244.9 85.9 2234.18 86.02 2247.3 88.9 86.22 2234.94 86.22 2243.94 86.22 2243.94 86.22 2243.94 86.23 2319.47 85.66 2358.88 85.75 2378.52 85.66 2648.05 88.74 278.84 86.24 244.45 85.95 2319.47 85.66 2358.88 85.75 2378.52 85.66 2648.05 88.74 278.84 86.23 244.45 85.95 2319.47 85.66 2344.45 86.23 1381.39 86.62 1335.76 85.99 2319.47 85.66 2344.45 86.23 1381.39 86.62 1335.76 85.99 2319.47 85.66 2344.45 86.23 1381.39 86.62 1335.76 85.99 2319.47 85.66 2342.34 88.98 234.64 86.23 1381.39 86.62 86.24 244.98 85.9 3319.47 85.62 86.24 86.24 86.23 1381.39 86.62 86.24 86.23 1381.39 86.62 86.24 86.23 1381.39 86.24 81.39 86.24 81.39 86.24 81.39 86.24 81.39 86.24 81.39 86.24 81.39 86.24 81.39 86.24 81.39 81.39 86.24 81.39 | | | | | | | | | | |
| 209,95 87,57 223,95 86,7 260,94 85,96 280,94 86,76 236,93 86,22 231,21 81,14 459,99 81,56 459,77 32,37 | | | | | | | | | | |
| 529,89 64,33 541,32 66,88 547,88 65,46 557,72 644,72 59,64 63,72 59,54 643,72 59,54 643,72 59,54 643,72 59,54 643,72 59,54 643,72 59,54 644,72 59,64 643,72 59,58 64,72 59,64 641,72 59,44 704,72 58,84 72,72 58,84 72,472 59,34 734,72 61,64 80,55 86,82 69,23 86,68 60,55 879,82 69,53 86,28 80,23 80,101,83 86,28 81,05 81,06 81,06 81,06 81,06 81,06 81,06 81,06 81,07 81,06 81,06 81,06 81,07 81,06 81,07 8 | 209.95 | | | | | | | | | |
| 594.72 60.04 594.72 60.04 654.72 60.04 664.72 60.04 664.72 60.04 664.72 60.04 664.72 59.34 674.72 58.48 674.72 58.48 674.72 58.48 60.05 873.93 64.64 800.5 64.81 818.81 73.07 913.81 74.7 938.86 78.35 960.8 82.25 974.37 82.44 89.91 1101.02 82.12 1012.88 83.12 102.48 84.06 1108.88 84.54 1104.17 82.12 1017.48 84.06 1108.88 84.64 1104.15 84.06 1108.88 84.64 1104.15 84.06 1108.88 84.64 1104.15 84.06 1108.88 84.56 1104.84 86.65 1504.42 86.65 1504.84 86.65 1504.84 86.52 1504.84 86.62 1504.84 86.52 1504.84 86.52 1504.84 86.52 1504.84 86.52 1504.84 86.52 1504.84 86.52 2296.24 86.12 | | 86.67 | 377.92 | | | | | | | |
| 644.72 60.04 654.72 60.04 664.72 59.54 674.72 59.74 704.72 58.84 7724.72 59.34 734.72 61.04 744.72 64.08 793.93 66.64 80.05 64.81 819.83 64.33 835.83 69.53 845.82 69.23 856.82 66.05 879.82 69.51 891.81 73.07 913.81 74.7 938.8 78.35 506.8 82.25 974.7 82.24 990.78 82.31 1017.02 88.45 1027.02 88.35 500.8 82.25 974.7 82.24 10272.8 83.2 1029.48 84.06 1108.88 84.45 11286.04 85.97 13105.72 86.86 1304.03 84.98 1231.107.02 86.45 12072.8 83.2 1029.48 84.06 1108.88 84.45 11286.04 85.97 13105.72 86.86 13101.12 86.46 1207.65 86.65 1879.82 69.51 | | | | | | | | | | |
| 1724, 72 59.34 734.72 61.04 744.72 64.08 793.93 64.64 800.5 66.15 891.81 73.07 913.81 74.7 938.86 78.35 960.8 82.25 974.37 82.24 990.78 82.31 1017.02 82.12 10272.8 83.2 1092.48 84.06 1018.88 84.18 1143.28 84.96 1161.38 84.48 1204.03 85.48 1233.55 86.56 1587.63 86.81 1807.43 86.55 1876.63 86.71 1512.42 86.55 1875.55 85.61 186.64 86.81 86.71 1512.42 86.55 1875.53 86.61 86.71 1512.42 86.55 1875.13 86.72 1513.86 86.21 186.22 186.21 186.22 186.22 190.81 86.23 1906.11 86.43 1907.84 86.92 1243.18 86.02 2247.33 85.92 2247.33 85.92 2247.33 85.92 2247.33 86.12 2247.33 85.92 <td></td> | | | | | | | | | | |
| 881.81 87 3.07 913.81 74.7 938.8 78.35 960.8 82.25 97.37 82.26 990.78 82.31 1017.02 82.12 1072.8 83.2 1002.48 84.05 1018.88 84.45 1148.25 84.96 1161.38 84.98 1204.03 85.48 1233.51 960.8 85.56 1256.52 85.91 1266.04 85.97 1205.73 86.26 1361.5 86.28 1391.19 86.48 1407.43 86.55 1433.84 86.45 1499.29 86.7 1512.42 86.55 15155.26 86.65 1555.35 86.12 1771.6 86.65 1587.87 86.8 1607.56 86.65 1620.68 86.75 1751.91 86.42 1771.6 86.65 14896.26 86.23 1906.11 86.42 180.53 86.12 2007.81 86.23 1906.11 86.42 180.20 86.20 86.75 1751.91 86.42 1771.6 86.82 2204.6 86.23 1906.11 86.43 1942.19 86.12 1961.88 86.28 1396.11 86.24 180.26 86.20 180.20 1 | | | | | | | | | | |
| 891.81 73.07 913.81 74.7 938.8 78.35 960.8 82.25 974.37 82.24 990.78 82.31 1017.02 82.12 1072.8 83.2 1092.48 49.66 1018.88 84.45 1148.25 84.96 1161.38 84.98 1204.03 85.48 1233.55 85.56 1256.52 85.91 1286.04 85.97 1205.73 86.26 12361.5 86.28 1381.19 86.48 1407.43 86.55 1251.473 86.55 1251.473 86.26 86.27 1771.6 86.55 1781.44 86.65 1587.87 86.8 1607.5 86.65 1555.2 86.65 1558.35 86.81 1771.47 86.86 44 1896.26 86.23 1906.1 86.5 1558.33 86.17 1860.18 86.27 1771.4 86.86 44 1896.26 86.23 1906.1 86.2 86.2 1242.1 | | | | | | | | | | |
| 990.78 82.31 1017.02 82.12 1072.8 83.2 1092.48 4.06 1108.88 84.45 1148.25 84.96 1161.38 84.96 1204.03 85.48 1233.55 85.56 1256.52 85.12 1206.04 85.97 1305.73 86.26 1361.5 86.28 1381.19 86.45 1499.29 86.7 1512.42 86.65 15487.3 86.55 15487.87 86.65 15487.47 86.65 15487.47 86.65 15487.47 86.65 15487.47 86.65 15487.48 86.51 1741.4 86.35 1549.14 86.35 1549.5 86.28 1305.1 186.24 1207.43 86.42 1207.4 186.2 1207. | | | | | | | | | | |
| 1148.25 84.96 1161.38 84.98 1204.03 85.48 1233.55 85.56 1236.22 85.56 1265.28 85.91 1423.84 86.45 1499.29 86.7 1512.42 86.55 1545.23 86.65 1587.35 86.81 1571.47 86.51 1781.44 86.35 1830.65 86.42 1891.21 86.41 196.26 86.23 1906.11 86.42 1896.12 1978.28 86.12 1291.84 86.32 1200.93 86.12 2195.76 88.92 2178.4 85.88 2204.65 86.23 1294.07 85.92 2247.3 85.92 2289.95 85.95 2319.47 85.68 2335.88 85.75 3278.52 85.62 2408.05 85.47 2424.45 85.12 2883.74 85.32 2319.83 84.82 2343.18 86.02 2247.3 85.47 2424.45 85.15 2883.74 85.42 2249.07 85.36 2542.5 85.02 2247.3 85.47 2498.65 2473.87 85.42 85.92 2343.18 | | | | | | | | | | |
| 1423.84 86.45 1499.29 86.7 1512.42 86.55 1545.22 86.65 1588.35 86.81 1571.47 86.55 1578.77 86.86 1607.56 86.65 1580.28 86.75 1751.91 86.21 1771.46 86.55 1781.44 86.35 1830.65 86.42 1850.33 86.17 1860.18 86.37 1886.42 2007.81 86.32 1906.11 86.43 1942.19 86.12 1916.18 86.37 1820.21 1916.18 86.37 1820.21 1916.18 86.37 1820.21 1916.18 86.37 1820.21 1916.18 86.37 1820.21 1916.18 86.37 1820.21 1916.18 86.32 1916.11 86.32 191 | | | | | | | | | | |
| 1571.47 86.65 1587.87 86.8 1607.56 86.65 1620.68 86.75 1751.91 86.42 1871.147 86.55 1587.44 86.55 1830.65 86.42 1850.33 86.17 1886.18 86.42 1871.148 86.51 1860.18 86.22 2007.93 86.42 1850.33 86.17 18860.18 86.52 1871.148 85.88 2204.65 86.02 2020.93 86.12 2096.93 86.22 12135.76 85.23 12135.79 85.23 12135.79 85.25 12135.7 | | 85.97 | 1305.73 | | | 86.28 | 1381.19 | | | 86.55 |
| 186.4.2 86.51 1781.44 86.35 1830.65 86.42 1850.33 86.17 1801.88 86.37 1886.42 1878.26 86.44 1896.26 86.23 1906.11 86.43 1942.19 86.12 19161.88 86.32 1918.28 86.12 2007.81 86.32 2020.93 86.16 2096.39 86.12 12155.76 85.99 2218.48 85.82 2204.65 86.62 2214.49 86.12 12155.76 85.99 22424.45 85.82 2204.65 86.62 2214.90.07 85.99 2243.18 86.02 2247.3 85.92 2424.45 85.15 2883.74 85.32 2490.07 85.36 2542.56 85.22 2608.17 85.42 2424.45 85.15 2883.74 85.32 2919.83 86.56 2749.24 85.10 2242.79 87.29 85.93 219.83 85.04 2700.03 84.86 2749.24 85.03 2791.88 85.04 2798.45 85.15 2883.74 85.32 2919.83 84.83 2936.23 85.11 2942.79 85.03 219.97 85.93 2018.25 86.38 3028.09 85.55 3057.62 88.95 3005.13 90.57 3008.41 90.13 3018.25 86.38 3028.09 85.55 3057.62 88.95 3005.13 90.57 3008.41 90.13 2311.49 92.67 3300.33 93.03 3326.63 3193.93 3326.63 313.37 85.93 3152.75 86.26 3175.72 87.24 3182.28 87.71 3215.09 91.51 3231.49 92.67 3300.33 93.03 3326.63 33.31 3366 93.11 3372.56 93.445.05 92.72 3457.85 92.85 3464.42 93.31 3474.26 93.31 3472.56 93.24 3457.85 92.72 3457.85 92.85 3464.42 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.31 3474.26 93.32 4421.31 93.34 182.33 3800.83 393.33 372.92 93.39 379.93 93.55 3697.34 86.03 3789.99 93.66 3376.65 376.65 366.65 376 | | | | | | | | | | |
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| 8651.25 85.28 8687.34 85.81 8710.31 85.84 8720.15 86.07 8759.52 86.04 8841.54 86.5 8867.78 86.44 8923.56 86.75 8946.52 86.71 8962.93 87.16 8976.05 86.82 8995.74 87.24 9028.54 87.11 9071.19 87.38 9097.44 87.34 9113.84 87.67 9136.81 87.49 9163.06 87.55 9176.18 87.74 9215.55 87.71 9335.24 87.92 9258.2 87.7 9274.6 87.25 9291.01 87.14 9307.41 87.47 9379.59 89.35 9386.15 89.27 9396 87.69 9412.4 87.02 9438.65 87.51 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87. | | | | | | | | | | |
| 8841.54 86.5 8867.78 86.44 8923.56 86.75 8946.52 86.71 8962.93 87.16 8976.05 86.82 8995.74 87.24 9028.54 87.11 9071.19 87.38 9097.44 87.34 9113.84 87.67 9136.81 87.49 9163.06 87.55 9176.18 87.74 9215.55 87.71 9325.24 87.92 9258.2 87.7 9274.6 87.25 9291.01 87.14 9307.41 87.47 9379.59 88.35 9386.15 89.27 9340.22 87.69 9412.4 87.02 9438.65 87.46 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.04 9792.97 87.08 9838.9 86.81 9874.99 86.89 8981.55 86.72 9911.08 86.79 9934.05 86.74 9966.86 86.79 9983.26 86.6410012.79 86.710058.72 86.53 | | | | | | | | | | |
| 8976.05 86.82 8995.74 87.24 9028.54 87.11 9071.19 87.38 9097.44 87.34 9113.84 87.67 9136.81 87.49 9163.06 87.55 9176.18 87.74 9215.55 87.71 9235.24 87.92 9258.2 87.7 9274.6 87.25 9291.01 87.14 9307.41 87.47 9320.54 87.39 9327.1 87.99 9340.22 87.59 9346.78 87.68 9363.19 87.46 9379.59 89.35 9386.15 89.27 9396 87.69 9412.4 87.02 9438.65 87.51 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9792.97 87.08 881.43 87.31 9707.67 87.16 9730.64 87.24 9975.6 87.04 9934.05 86.67 9983.26 86.89 86.49 986.89 8881.55 86.71 9910.08 86.53 | | | | | | | | | | |
| 9113.84 87.67 9136.81 87.49 9163.06 87.55 9176.18 87.74 9215.55 87.71 9235.24 87.92 9258.2 87.7 9274.6 87.25 9291.01 87.14 9307.41 87.47 9320.54 87.39 9327.1 87.99 9340.22 87.5 9346.78 87.68 9363.19 87.46 9379.59 89.35 9386.15 89.27 9396 87.69 9412.4 87.02 9438.65 87.51 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87.24 9792.97 87.08 9838.9 86.81 9874.99 86.88 9881.55 86.72 9911.08 86.91 10071.84 86.5810134.18 86.4510291.66 86.5810203.08 86.4510239.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.86 | | 86.82 | 8995.74 | | | 87.11 | 9071.19 | | | 87.34 |
| 9320.54 87.39 9327.1 87.99 9340.22 87.5 9346.78 87.68 9363.19 87.46 9379.59 89.35 9386.15 89.27 9396 87.69 9412.4 87.02 9438.65 87.51 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87.04 9792.97 87.08 9838.9 86.81 8874.99 86.89 881.55 86.72 9910.88 86.91 9934.05 86.74 9966.86 86.79 9983.26 86.6410012.79 86.710058.72 86.53 10071.84 86.5810134.18 86.4510291.66 86.5310314.62 86.69910331.03 86.86 86.36 86.36 86.8910331.03 86.86 86.9910331.03 86.86 | 9113.84 | 87.67 | | 87.49 | 9163.06 | 87.55 | 9176.18 | 87.74 | 9215.55 | 87.71 |
| 9379.59 89.35 9386.15 89.27 9396 87.69 9412.4 87.02 9438.65 87.51 9484.58 87.29 937.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87.04 9792.97 87.08 9838.9 86.81 9874.99 86.88 981.55 86.72 9911.08 86.91 9934.05 86.74 9966.86 86.79 9983.26 86.6410012.79 86.710058.72 86.53 10071.84 86.5810134.18 86.4510193.23 86.5810203.08 86.4510239.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.86 | | | | | | | | | | |
| 9484.58 87.82 9537.07 87.43 9563.32 87.61 9592.84 87.36 9612.53 87.5 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87.04 9792.97 87.08 9838.9 86.81 9874.99 86.88 9881.55 86.72 9911.08 86.91 19934.05 86.74 9966.86 86.79 9983.26 86.410012.79 86.710058.72 86.53 10071.84 86.5810134.18 86.4510291.66 86.5810203.08 86.451023.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.88 | | | | | | | | | | |
| 9625.65 87.38 9681.43 87.31 9707.67 87.16 9730.64 87.24 9753.6 87.04 9792.97 87.08 9838.9 86.81 9874.99 86.88 9881.55 86.72 9911.08 86.91 9934.05 86.74 9966.86 86.79 9983.26 86.6410012.79 86.7710058.72 86.53 10071.84 86.5810134.18 86.4510193.23 86.5810203.08 86.4510239.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.88 | | | | | | | | | | |
| 9792.97 87.08 9838.9 86.81 9874.99 86.88 9881.55 86.72 9911.08 86.91 9934.05 86.74 9968.6 86.79 9983.26 86.6410012.79 86.7710058.72 86.53 10071.84 86.5810134.18 86.451093.23 86.5810230.30 86.4510239.17 86.55 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.88 | | | | | | | | | | |
| 9934.05 86.74 9966.86 86.79 9983.26 86.6410012.79 86.7710058.72 86.58 10071.84 86.5810134.18 86.4510193.23 86.5810203.08 86.4510239.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.89 | | | | | | | | | | |
| 10071.84 86.5810134.18 86.4510193.23 86.5810203.08 86.4510239.17 86.5 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.88 | | | | | | | | | | |
| 10262.13 86.36 10285.1 86.510291.66 86.2310314.62 86.9910331.03 86.88 | | | | | | | | | | |
| 10344.15 86.5510380.24 86.2210393.36 86.5810406.49 86.2410436.02 86.46 | 10262.13 | 86.36 | 10285.1 | 86.51 | 10291.66 | 86.231 | 10314.62 | 86.99 | 10331.03 | 86.88 |
| | 10344.15 | 86.551 | 0380.24 | 86.221 | 10393.36 | 86.581 | 10406.49 | 86.24 | 10436.02 | 86.46 |

85.6910531.16

```
10554.12
              85.5210580.37
                                   85.910600.05
                                                      85.4810636.14
                                                                          85.6410652.55
                                                    106.7510793.62
10750.97
              98.5810754.25
                                 99.03 10780.5
                                                                        109.1310823.15
                                                                                            109.95
 10849.4
                                111.29 10865.8
100.7910908.45
            110.8210859.24
                                                    110.7410875.64
                                                                        109.2710885.49
10888.77
            106.9610898.61
                                                      95.110924.86
                                                                         87.5710928.14
             87.2711049.53
                                 87.5211059.37
                                                     93.5711065.93
11046.25
                                                                          94.5611079.05
Manning's n Values
          n Val Sta
.101 459.9
                                n Val
                                              Sta
                                                                          .066 1361.5
                                  .066 529.89
                                                      .015 819.83
                                                                                              .074
                               Lengths: Left Channel Right
1496.01 1684.16 1239.16
0 Elevation= 108.08
0859.24 Elevation= 111.29
Bank Sta: Left Right 459.9 960.8
                                                                          Coeff Contr.
                                                                                             Expan.
Left Levee Station=
Right Levee
                   Station=10859.24
Blocked Obstructions num=
Sta L Sta R Elev
   Sta L Sta R Elev
0 153.96 99.41
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
Vel Head (ft)
                                                                               Left OB
                                    95 02
                                                                                             Channel
                                                                                                         Right OB
                                               Wt. n-Val.
                                                                                              0.041
                                     0.10
                                               Reach Len. (ft)
Flow Area (sq ft)
                                                                                                         1239.16
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                              1496.01
                                                                                            1684.16
                                    94.92
                           0.000123
  E.G. Slope (ft/ft)
                                                                                                         77707.34
                                              Area (sq ft)
                                                                              2655.39
                                                                                          14304.21
                                              Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                            53440.44
  Q Total (cfs)
                                125000.00
                                                                               1945.49
                                                                                                          69614 07
  Top Width (ft)
Vel Total (ft/s)
                                10558.11
                                                                                             500.90
                                     1 32
                                                                                  0.73
                                                                                               3 74
                                                                                                             0 90
  Max Chl Dpth (ft)
                                    36.08
  Conv. Total (cfs)
Length Wtd. (ft)
                                11262900.0
                                              Conv. (cfs)
Wetted Per. (ft)
                                                                               175294.6
                                                                                             4815155.0
                                                                                                            6272450.0
                                                                                                          9784.30
                                 1412.93
                                                                                             507.72
                                               Shear (lb/sq ft)
Stream Power (lb/ft s)
  Min Ch El (ft)
                                    58.84
                                                                                  0.07
                                                                                               0.22
                                                                                                             0.06
                                                                                                0.81
```

Cum Volume (acre-ft)

Cum SA (acres)

85.610518.04

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

30083.97

82.87 7804.45

83.06 7774.93 82.85 7902.87 20631.48

1022 18

7165 30

CROSS SECTION

RIVER: Rio Grande

Frctn Loss (ft)

C & E Loss (ft)

REACH: Lower Reach RS: 135.5

INPUT

7538.73

82.99 7669.95

82.92

7729

Description: RGV-02, Updated on left with new survey to Station 1569. New Cross-section, Bathymetric elevations translated from IBWC 2008 135 Cross-section

0.18

0 00

Station Elevation Data num= Sta 73.99 Sta 89.99 Sta Elev Sta 86.7 157.98 87.89 187.97 84.86 85.25 85.68 330.95 733.88 81.12 257.96 81.69 304.96 369.95 68.6 421.94 67.78 444.94 69.88 465.93 67.78 67.78 770.88 75.79 73.64 776.88 904.85 74.47 83.6 790.87 982.83 81.66 837.86 83.03 1031.82 82.16 80.58 1109.81 876.86 82.61 1357.76 84.07 1604.17 84.77 1718.99 82.58 1459.74 84.43 1623.86 84.25 1531.73 84.26 1659.94 1233 78 83.36 1569.72 84.55 1686.18 84.43 1699.31 84.52 1755.08 84.77 1784.6 84.4 1797.72 84.72 84.8 1866.61 84.83 2010.95 84.54 1919.1 84.65 2043.76 85.13 1945.34 84.79 2089.69 84.76 1932.22 84.92 2056.88 1997.83 85.14 2119.21 84.48 2148.74 97.73 2201.22 93.38 2165.14 93.44 2217.63 98.83 2168.42 88.5 2230.75 99.27 2181.54 85.74 2247.15 2188.1 85.11 2256.99 77.95 2286.52 75.34 2361.97 76.6 2296.36 75.09 2368.53 75.77 2319.32 75.29 2384.93 83.12 2276.67 75 31 75.72 2335.72 2325.88 2411.18 74.65 2430.86 76.25 2447.26 79.63 2463.66 84.68 2470.22 87.13 88.67 2486.63 76.68 2545.68 88.47 2493.19 75.8 2555.52 86.72 2506.31 75.61 2571.92 81.4 2519.43 76.61 2578.48 2532.55 77.5 81.91 2614.57 80.77 2676.9 79.42 2634.25 79.71 2732.66 2591.6 78.31 2608.01 81.26 2621.13 78.8 2653.93 79.45 2670.33 80.65 2683.46 80.43 81.04 2775.31 81.99 2854.04 80.86 2785.15 79.84 2877.01 81.79 2794.99 79.46 2886.85 81.2 2811.4 79.59 2899.97 2742.51 2837.64 2913 09 79 57 2926 21 79 67 2936 05 78.47 2955.74 77 63 2991 82 78 14 79.21 3060.71 79.86 3142.73 80.55 3116.48 79.41 3126.32 3103.36 78.91 3152.57 80.19 80.26 3168.97 64.72 3211.62 76.38 3175.53 64.37 3218.62 74.43 3188.65 61.74 3228.62 72.53 3198.49 61.14 3248.62 3159.13 3205.06 61.64 60.74 3288.62 60.84 3358.62 3268.62 61.34 3278.62 60.64 3298.62 61.14 3308.62 60.64 3328.62 59.94 3378.62 60.44 3388.62 3318.62 3398 6 64.37 3401.89 64.55 3408.45 67.59 3428.13 74 77 3434 69 78 78 83.95 3562.63 3519.98 84.51 3542.95 83.89 3588.87 83.13 3628.24 83.95 85.1 3657.76 85.06 3703.69 87.27 3670.89 86.9 3713.53 87.44 3677.45 86.04 3756.18 86.01 3690.57 3697.13 86.08 3779.14 86.26 3805.39 85.96 3854.59 86.28 3867.72 85.95 4028.46 85.91 3887.4 85.65 4064.55 86.18 3923.48 85.7 4077.67 86.12 86.18 4015.34 85.73 4212.17 85.59 4330.28 85.58 4402.45 84.88 4481.19 84.5 4589.45 85.49 4202.33 85.78 4327 85.35 4372.93 85.26 4136.72 85.33 4287.63 4103 91 85.49 4117.04 85.18 85.82 4244.98 86.48 4353.24 4340.12 85.4 4343.4 85.11 85.31 4438.54 84.81 4513.99 85.07 4451.66 84.81 4530.4 85.22 4461.5 84.16 4559.92 4409.01 4491.03 84.25 84.37 4658.34 83.81 4819.09 4612.41 4743.64 84.53 4632.09 83.93 4796.12 84.46 4668.18 83.87 4832.21 84.27 4697.71 83.66 4878.14 83.62 4927.35 83.51 5006.08 83.05 5134.03 4897.82 83.38 4963.44 83.36 4979.84 83.26 83.36 5061.85 83.05 5094.66 83.22 5124.18 5202.92 83.11 5212.76 83.4 5232.44 83.46 5261.97 83.28 5275.09 83.69 83.67 5311.18 84 5445.69 84.08 5327.58 84.12 5550.67 83.94 5360.39 84.07 5567.07 83.92 5609.72 5432.56 84.15 5622.84 83.93 5652.37 83.67 5822.96 84.06 5698.3 83.79 5842.64 83.63 5750.79 83.61 5937.78 83.58 5773.75 83.56 5944.34 5800 6016.52 83.34 6121.5 83.21 6347.86 83.28 6039.48 83.27 6157.58 83.14 6183.83 83.35 6433 15 83 09 6446 28 83.46 6462.68 83 11 6521 73 83.01 6584.06 83.18 6741.53 83 07 83.09 6692.32 83.74 6879.32 6728.41 6810.42 83.2 6869.48 83.47 6912.12 83.34 6974.46 83.43 83.22 7118.81 83.17 7299.24 83.4 7168.02 82.96 7351.73 83.25 7184.42 82.91 7377.98 83.33 7210.66 83.06 7407.5 7273 82.88

```
83.24 8014.41
                                                                                            83.13 8125.95
                                                                        83
 8139.08
8375.27
                 83.33 8207.97
                                         83.11 8270.3
83.21 8463.84
                                                                  83.12 8289.98
83.7 8572.09
                                                                                            83.28 8319.5
                                                                                                                     83.18
                                                                  83.63 8936.23
                                                                                           83.61 8959.19
83.79 9156.02
 8765.64
                 82.85 8814.85
                                              83 8916.55
                                                                                                                     83.88
 9034.64
                                          83.84 9070.73
                 84.03 9051.05
                                                                   83.97 9126.5
                 83.43 9195.39
                                          83.26 9211.79
                                                                  82.51
                                                                                9261
                                                                                           82.26 9329.89
                                                                                                                     82.19
                 82.22 9428.31
82.03 9667.78
                                         82.03 9490.63
82.25 9723.54
                                                                  82.14 9520.16
82.19 9759.63
                                                                                           82.03 9582.49
82.3 9772.75
 9372.54
 9648.09
                                                                                                                     82.17
 9798.99
                 82.29 9821.96
                                         82.59 9841.64
83.5610061.43
                                                                  82.54 9864.6
                                                                                           82.84 9900.69
                 85.3510143.44
86.5210310.75
86.8510438.69
10107.36
                                           85.610182.81
                                                                   86.3110192.65
                                                                                            86.1510264.82
                                                                                                                      86.3
                                                                                           86.1510264.82
86.6510392.76
87.4210514.14
87.4610681.45
87.3210868.43
                                         86.3810353.39
87.1310455.09
                                                                  86.6910373.08
87.0910481.33
    10419
                                                                                                                     87.38
10527.26
                 87.5610576.47
87.2610720.81
                                         87.3410583.03
87.4810786.42
                                                                  87.5910615.84
                                                                                                                      87 5
10704.41
                                                                  87.1710825.79
                                                                                                                     87.02
10894.68
11058.7
                 87.0510917.64
                                         86.7410976.69
86.5111140.71
                                                                  86.8910986.53
86.3411206.32
                                                                                           86.7111025.89
86.211222.72
                                                                                                                     86.82
                   86.511124.31
                86.64 11242.4
86.0311478.59
85.7911636.06
                                         85.7711281.76
85.8711501.56
                                                                  86.111363.78
86.0111547.48
                                                                                           85.9811370.34
85.8611580.29
11232.56
                                                                                                                      85.8
11439.23
11616.38
                                          85.9111695.11
                                                                  85.8311721.35
                                                                                           85.9611813.21
                                                                                                                     85.93
                                         85.9411885.38
85.9612046.12
                                                                  85.8511941.15
85.6712072.37
11819.77
                   85.811875.54
                                                                                             85.911950.99
12019.88
                85.6812039.56
                                                                                           85.8812157.66
                                                                  85.9112249.51
88.3112295.44
93.0612357.77
12183.9
12262.63
                85.8712216.71
83.4 12269.2
                                         84.7412236.39
86.3212282.32
                                                                                           85.312256.07
89.4312315.12
12321.68
                90.3112331.52
                                          92.4512354.49
                                                                                             92.812367.61
                                                                                                                     88.19
Manning's n Values
                                                               n Val Sta
.015 3408.45
                               Sta n Val Sta
52.57 .066 3198.49
       Sta n Val Sta
0 .101 3152.57
                                                                                                                      .074
                                                                                             .066 3670.89

        Bank Sta: Left
        Right
        Lengths: Left Channel
        Right

        3152.57
        3474.06
        911.83
        679.76
        443.07

        Left Levee
        Station=1231.54
        Elevation=
        99.19

        Right Levee
        Station=12354.49
        Elevation=
        93.06

                                                                                             Coeff Contr.
                                                                                                                     Expan.
| Sta L | Sta R | Elev | Sta L | Sta R | 2192.68 | 2476.62 | 88.51 | 3470.4212454.08
CROSS SECTION OUTPUT Profile #Design Flow
   E.G. Elev (ft)
                                            94.83
                                                          Element
   Vel Head (ft)
                                                                                                     0.101
                                                           Wt. n-Val.
                                                                                                                                       0.074
                                              0.09
                                                                                                                     0.037
                                                          wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
   W.S. Elev (ft)
Crit W.S. (ft)
                                             94.74
88.08
                                                                                                                   679.76
8855.08
                                                                                                   911.83
                                                                                                                                      443.07
                                                                                                 11740.90
                                                                                                                                   78101.35
   E.G. Slope (ft/ft) 0.000137
                                                                                                11740 90
                                                                                                                   8855.08
                                                                                                                                   78101.35
                                        125000.00
                                                                                                 10727.52
                                    10318.00
                                                          Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
   Top Width (ft)
Vel Total (ft/s)
                                                                                                   955.34
                                                                                                                    321.49
                                                                                                                                    9041.17
                                         1.27
                                                                                                                     4.16
27.54
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                     12.29
                                                                                                                                         8.64
                                                           Conv. (cfs)
Wetted Per. (ft)
                                                                                                                                       6617361.0
                                        10686090.0
                                                                                                    917081.3
                                                                                                                   3151644.0
                                        552.71
                                                                                                                     329.95
                                                           Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                                     0.23
   Min Ch El (ft)
                                             59 94
                                                                                                      0.10
                                                                                                                                         0 07
   Alpha
   Frctn Loss (ft)
                                                           Cum Volume (acre-ft)
                                                                                                29836.76
                                                                                                                 20183.78
                                              0.07
                                                                                                                                  43978.33
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Cum SA (acres)

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 135

| INDUI. | | | | | | | | | |
|-------------|----------|---------|-----------|-----------|---------|----------|---------|-----------|-------|
| Description | on: Bath | ymetric | elevation | ons trans | lated f | rom IBWC | 2008 Cr | oss-secti | ons |
| Station E | | | num= | 459 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 86.56 | 9.83 | 86.74 | 22.93 | 90.19 | 49.14 | 98.83 | 62.25 | 98.95 |
| 65.52 | 98.56 | 85.18 | 92.06 | 95.01 | 89.03 | 101.56 | 87.59 | 111.39 | 86.61 |
| 124.49 | 85.79 | 157.26 | 79.39 | 163.81 | 78.77 | 183.46 | 78.69 | 199.85 | 79.41 |
| 206.4 | 79.93 | 216.23 | 81.41 | 229.33 | 83.81 | 255.54 | 84.97 | 265.37 | 83.99 |
| 271.92 | 82.2 | 275.2 | 82.33 | 281.75 | 84.06 | 288.3 | 84.77 | 294.85 | 84.93 |
| 304.68 | 84.42 | 337.44 | 84.06 | 350.55 | 83.8 | 363.65 | 84.81 | 376.76 | 87.17 |
| 389.86 | 87.11 | 396.42 | 85.23 | 406.24 | 81.28 | 416.07 | 78.99 | 425.9 | 76.29 |
| 442.28 | 75.15 | 458.66 | 75.27 | 468.49 | 76.44 | 481.6 | 77.56 | 491.42 | 78.87 |
| 497.98 | 78.61 | 504.53 | 77.28 | 537.29 | 77.73 | 556.95 | 78.38 | 563.5 | 78.35 |
| 576.6 | 78.85 | 589.71 | 78.22 | 606.09 | 78.74 | 612.64 | 79.28 | 625.75 | 78.53 |
| 648.68 | 79.85 | 655.23 | 79.31 | 678.16 | 78.28 | 691.27 | 77.89 | 710.93 | 77.81 |
| 720.75 | 77.07 | 727.31 | 77.53 | 740.41 | 77.16 | 756.79 | 76 | 766.62 | 76.36 |
| 779.72 | 75.76 | 792.83 | 77.08 | 799.38 | 76.32 | 805.93 | 76.12 | 812.49 | 76.77 |
| 828.87 | 77.3 | 838.7 | 77.4 | 851.8 | 76.93 | 874.73 | 78.01 | 881.29 | 77.56 |
| 894.39 | 74.96 | 910.77 | 73.28 | 920.6 | 71.51 | 927.15 | 70.9 | 936.98 | 72.22 |
| 940.26 | 73.26 | 950.08 | 77.62 | 953.36 | 77.35 | 963.19 | 74.34 | 969.74 | 73.05 |
| 976.29 | 70.75 | 982.85 | 67.03 | 989.4 | 64.43 | 992.67 | 62.07 | 999.67 | 58.67 |
| 1009.67 | 58.07 | 1029.67 | 58.57 | 1049.67 | 58.27 | 1059.67 | 57.67 | 1069.67 | 57.57 |
| 1079.67 | 58.07 | 1089.67 | 58.07 | 1099.67 | 57.57 | 1109.67 | 57.77 | 1139.67 | 56.87 |
| 1159.67 | 57.37 | 1159.76 | 64.27 | 1166.31 | 64.85 | 1172.86 | 67.39 | 1176.14 | 69.57 |
| 1185.97 | 73.29 | 1199.07 | 76.83 | 1208.9 | 82.46 | 1215.45 | 85.78 | 1218.73 | 86.64 |
| 1225.28 | 86.88 | 1238.39 | 86.54 | 1254.77 | 85.77 | 1267.87 | 85.72 | 1280.98 | 85.18 |
| 1294.08 | | 1310.46 | | 1320.29 | | 1330.12 | | 1339.95 | 83.93 |
| 1366.16 | 83.8 | 1382.54 | 83.29 | 1405.47 | 83.81 | 1418.58 | 83.26 | 1425.13 | 83.55 |
| 1434.96 | 83.15 | 1451.34 | 83 | 1470.99 | 83.11 | 1484.1 | 82.97 | 1503.76 | 83.3 |
| 1513.58 | 82.74 | 1543.07 | 82.56 | 1582.38 | 83.28 | 1598.76 | 84.06 | 1611.87 | 84.38 |
| 1618.42 | 84.88 | 1651.18 | 85.6 | 1664.29 | 85.36 | 1687.22 | 85.52 | 1693.77 | 85.22 |
| 1697.05 | | 1703.6 | | 1723.26 | | 1749.47 | | 1756.02 | 85.34 |
| 1769.12 | | 1805.16 | | 1814.99 | | 1851.03 | | 1857.58 | 85.16 |
| 1873.96 | | 1896.9 | | 1913.28 | | 1926.38 | | 1936.21 | 84.97 |
| 1952.59 | | 1978.81 | | 2008.33 | | 2037.85 | | 2047.69 | 84.64 |
| 2064.1 | | 2106.74 | | 2119.86 | | 2185.47 | | 2208.43 | 84.61 |
| 2221.55 | 84.33 | 2228.11 | | 2260.92 | | 2280.6 | 84.22 | 2300.28 | 84.48 |
| 2339.65 | 84.24 | 2349.49 | 83.96 | 2395.41 | 84.06 | 2421.66 | 83.77 | | 84.02 |
| 2483.98 | 83.6 | 2490.54 | 83.93 | 2513.51 | 83.57 | 2536.47 | 83.76 | 2549.59 | 83.47 |
| 2565.99 | 83.69 | 2575.83 | 84.11 | 2644.72 | 84.36 | 2677.52 | 84.2 | 2730.01 | 84.17 |
| 2766.09 | | 2775.94 | | 2795.62 | | 2802.18 | | 2844.82 | 84.23 |
| 2864.51 | | 2887.47 | | 2939.95 | | 2979.32 | | 3008.84 | 83.56 |
| 3081.01 | | 3133.5 | 83.42 | 3166.3 | | 3176.14 | | 3202.38 | 83.55 |
| 3248.31 | 83.49 | 3271.27 | 83.66 | 3294.23 | 83.61 | 3392.64 | 83.87 | 3432.01 | 83.74 |
| | | | | | | | | | |

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3448.41
3625.55
               83.86 3510.74
                                                            83.63 3576.34
               83.66 3641.95
                                     83.52 3681.32
                                                            83.77 3694.44
                                                                                  83.75 3710.84
                                                                                                        83.45
83.36
                                                                                  83.25 3996.23
 3910.94
               83.54 3927.34
                                     83.35 3953.59
                                                            83.42 3983.11
                                                                                                         83.31
  4035.6
               83.18 4065.12
                                      83.36 4114.32
                                                            83.26 4137.29
                                                                                  83.41 4166.81
               83.47 4216.01
 4183.21
                                     83.38 4275.06
                                                            83.58 4307.86
                                                                                  83.43 4324.26
                                                                                                         83.53
               83.38 4366.91
83.46 4540.76
                                     83.57 4412.83
83.36 4560.44
                                                            83.41 4442.35
83.5 4606.37
                                                                                  83.52 4494.84
83.4 4612.93
 4353.79
  4517.8
                                                                                                          83.3
                                     83.46 4747.42
83.19 4868.79
83.05 5049.21
 4681.82
               83.32 4724.46
                                                           83.31 4780.22
83.11 4954.08
                                                                                  83.46 4799.91
83.18 4977.04
                                                                                                         83.32
 5006.56
               83.17 5019.68
                                                            83.15 5095.13
                                                                                  82.97 5121.37
                                                                                                         83.05
                                     83.04 5193.54
82.89 5370.68
83 5537.97
               82.92 5173.86
82.96 5308.35
                                                           82.9 5206.66
82.94 5406.76
 5265.71
                                                                                  82.81 5419.88
                                                                                                         82.96
 5439.56
                82 9 5498 61
                                                            82.82 5557.65
                                                                                  82.94 5583.9
                                                                                                         82 81
               82.95 5698.71
                                     82.92 5731.51
                                                            82.83 5757.75
                                                                                  82.88 5813.52
  5616.7
                                                                                                         82.69
 5836.48
               82.85 5875.84
83.57 5974.25
                                     82.85 5888.96
                                                           83.35 5905.36
83.24 6030.02
                                                                                  83.56 5931.61
                                       83.4 6016.89
                                     82.99 6125.14
83.45 6348.2
               83.09 6118.58
                                                           82.81 6216.99
83.56 6374.45
                                                                                  83.14 6230.11
83.31 6413.81
  6082.5
                                                                                                         83.35
                                              6348.2
 6476.13
               83.03 6492.54
                                       83.2
                                                            84.25 6522.06
                                                                                  83.92 6535.18
                                                                                                          82.7
               83.6 6561.42
82.97 6722.16
                                                           82.81 6617.19
83.06 6768.08
                                                                                  82.94 6630.31
82.91 6787.76
 6551 58
                                       83.1 6604.07
 6649.99
                                     82.79 6735.28
               83.06 6941.94
83.39 7132.19
                                     82.82 6968.18
83.35 7155.16
                                                           83.02 7010.82
83.14 7171.56
                                                                                  83.18 7020.66
83.42 7184.68
 6889.45
  7109.23
                                     83.84 7237.16
 7201.08
               83.77
                        7230.6
                                                            83.68 7276.53
                                                                                  83.98 7306.05
                                                                                                         83.95
                                                           83.68 /2/6.53
84.36 7414.3
85.03 7555.35
84.48 7689.84
84.55 7771.85
                                     84.16 7374.93
84.65 7525.83
                                                                                  84.29 7473.34
84.57 7565.19
 7502.87
               84.79 7515.99
                                                                                                         84.67
                                                                                  84.87 7696.4
85.05 7798.09
87.41 7922.74
 7604.56
7739.05
               84.46 7627.52
85.01 7752.17
                                     84.64 7634.08
84.99 7758.73
                                                                                                         86.35
 7837 46
               87.59 7840.74
                                       87.4 7847.3
                                                           88 11 7873 54
                                                                                                         86 99
               87.16 7948.99
                                     86.87 7958.83
                                                            87.18 7968.67
                                                                                  86.96 7985.07
  7932.58
                                                                                                         87.25
                                     87.16 8070.36
87.04 8155.64
                                                                                  87.12 8106.44
87.24 8188.45
 8011.31
               87.32 8057.24
                                                            87.37 8083.48
                                                                                                          87.3
                                     86.96 8240.93
 8211.41
               87.15 8217.97
                                                            87.13 8277.01
                                                                                  86.88 8290.14
                                                                                                          87.1
 8296.7
8434.47
               86.87 8309.82
86.59 8473.83
                                     87 8332.78
86.22 8490.23
                                                           86.67 8381.98
86.43 8503.35
                                                                                  86.94 8418.07
86.29 8546
                                                                                               8546
                                                                                                         86.49
                                                                                  86.21 8624.72
85.62 8847.78
               86.23 8572.24
86.23 8683.77
                                     86.35 8582.08
85.71 8732.97
 8552 56
                                                             86.1 8614.88
                                                                                                         86 05
                                                            85.78 8818.26
                                     85.71 8942.91
 8896.99
               85.54 8926.51
                                                           85.35 8965.87
                                                                                  85.98 8972.43
                                                                                                         85.75
                                                            85.36 9008.52
                                     85.79 9067.56
85.52 9182.37
85.62 9274.22
                                                           85.42 9080.68
85.58 9198.77
                                                                                  84.61 9097.08
85.39 9218.45
85.66 9346.38
               85.42 9051.16
85.59 9143.01
  9044.6
                                                                                                         85.35
 9116.76
9225.01
               85.39 9257.82
                                                            85.52 9320.14
                                                                                                         85.39
                                     85.63 9434.95
85.38 9520.24
 9369 35
               85.63 9398.87
                                                            85.37 9451.35
                                                                                  85.48 9471.03
               85.55 9513.68
85.65 9598.96
 9480.88
                                                                      9543.2
                                                                                  85.62 9556.32
                                                            85.56
                                     85.47 9641.61
                                                            85.58 9658.01
 9582 56
                                                                                  85.38 9664.57
                                                                                                         85.53
 9700.65
               85.32 9710.49
                                     85.53 9733.46
                                                            85.47 9753.14
                                                                                  85.95 9766.26
 9785.94
               84.83 9805.62
                                     87.05 9808.9
                                                               87 9818.74
                                                                                  84.62 9825.3
                                                                                                         84.42
              83.58 9841.71
86.74 9874.51
                                     83.19 9848.27
91.26 9877.79
88.62 9940.11
                                                           83.97 9858.11
                                                                                  84.19 9864.67
                                                           92.12 9890.91
                                                                                  92.59 9926.99
 9867.95
                                                                                                         92.98
 9933 55
                 91 1 9936 83
                                                           87.34 9943.39
                                                                                  87.2710068.04
10071.32
              87.4410081.17
                                     92.2810084.45
                                                           93.5210097.57
Manning's n Values
                                   n Val
            n Val Sta
.101 874.73
                            Sta
      Sta
                                                   Sta
                                                          n Val
                                                                         Sta
                                                                                  n Val
                                                                                                Sta
                                                                                                        n Val
                                     .066 982.85
                                                           .015 1176.14
                                                                                  .066 1225.28
Bank Sta: Left
                      Right
                                    Lengths: Left Channel
                                                                     Right
                                                                                   Coeff Contr.
                                                                                                         Expan
          874.73 1208.9
                                    1851.1 1850 1680.42
62.25 Elevation= 98.9
                                                                                           .1
                                                                    98.95
Left Levee
                     Station=
                      Station= 9926.99
Right Levee
                                                    Elevation=

        ocked Obstructions
        num=
        2

        Sta L
        Sta R
        Elev
        Sta L
        Sta R

        47.32
        385.35
        87.1
        1257.4610323.38

Blocked Obstructions
CROSS SECTION OUTPUT Profile #Design Flow
                                                    Element
                                                                                                       Channel
                                                    Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                         0.08
                                                                                          0.101
                                                                                                          0.041
                                                                                                                         0.074
                                        94.67
82.48
                                                                                                       1850.00
                                                                                       10446.61
                                                                                                       9783.30
                                                                                                                      77873.08
  Crit W.S. (ft) 82.48
E.G. Slope (ft/ft) 0.000134
Q Total (cfs) 125000.00
Top Width (ft) 10020.30
                                                                                                                     77873.08
                                                    Area (sq ft)
                                                                                                       9783.30
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                         9866.77
                                    125000.00
                                                                                                       38156.10
                                                                                                                       76977.13
                                                      Flow (cfs)
                                                    Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                         797.46
                                                                                                        334.17
                                                                                                                       8888.67
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                        37 80
                                                                                          13 10
                                                                                                          29 28
                                                                                                                           8 76
                                   10787780.0
                                                                                                         3292956.0
                                                                                                                      8895.86
                                     1747.14
                                                                                         801.04
                                                                                                         350.60
                                                                                                        0.23
                                                    Shear (lb/sq ft)
Stream Power (lb/ft s)
   Min Ch El (ft)
                                         3.27
                                                                                            0.10
                                                                                                           0.91
  Alpha
  Frctn Loss (ft)
C & E Loss (ft)
                                                    Cum Volume (acre-ft)
Cum SA (acres)
                                         0 19
                                                                                     29604 54
                                                                                                     20038.35
                                                                                                                     43185.09
                                         0.00
                                                                                        6803.26
                                                                                                       1001.17
Warning: The cross-section end points had to be extended vertically for the computed water surface.
```

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

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RIVER: Rio Grande
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RS: 134.65

Description: Bathymetric elevations translated from IBWC 2008 Cross-sections Station Elevation Data num= 459

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|--------|-------|--------|-------|--------|-------|---------|-------|---------|-------|
| 0 | 95.58 | 6.56 | 97.67 | 13.12 | 98.04 | 22.96 | 97.97 | 29.53 | 96.54 |
| 39.37 | 93.17 | 49.21 | 90.27 | 68.89 | 85.2 | 82.02 | 82.54 | 91.86 | 81.47 |
| 118.11 | 81.47 | 141.07 | 81.7 | 170.6 | 81.7 | 193.56 | 81.49 | 200.12 | 81.63 |
| 259.18 | 81.51 | 298.54 | 81.71 | 311.67 | 81.63 | 344.47 | 81.78 | 364.16 | 81.7 |
| 410.09 | 82.05 | 433.05 | 81.93 | 472.42 | 82.32 | 495.39 | 82.86 | 515.07 | 82.92 |
| 528.19 | 82.7 | 547.88 | 82.68 | 564.28 | 82.4 | 577.41 | 82.39 | 587.25 | 82.1 |
| 593.81 | 81.56 | 600.37 | 79.96 | 603.65 | 79.66 | 616.77 | 79.66 | 620.05 | 79.26 |
| 629.9 | 74.95 | 639.74 | 71.97 | 649.58 | 70.19 | 679.11 | 70.44 | 682.39 | 70.82 |
| 688.95 | 72.9 | 698.79 | 77.37 | 705.35 | 81.41 | 708.63 | 82.75 | 711.91 | 83.05 |
| 734.88 | 82.68 | 757.84 | 83 | 770.97 | 83.65 | 777.53 | 82.86 | 790.65 | 79.9 |
| 800.49 | 79.13 | 807.05 | 79.12 | 816.9 | 79.78 | 826.74 | 79.62 | 830.02 | 78.94 |
| 836.58 | 75.42 | 843.14 | 70.72 | 846.42 | 68.9 | 856.26 | 64.72 | 862.83 | 63.98 |
| 894.14 | 58.3 | 906.14 | 57.91 | 913.14 | 57.3 | 935.14 | 56.4 | 955.14 | 56.7 |
| 964.14 | 56.1 | 975.14 | 56.3 | 995.14 | 56 | 1006.14 | 56.5 | 1015.34 | 56.2 |
| | | | | | | | | | |

1016.78 63.98 1023.32 65.84 1033.14 70.88 1046.24 75.33 1052.78 76.69

| 1016.78 | 63.98 | 1023.32 | 65.84 | 1033.14 | . 70.88 | 1046.24 | 75.33 | 1052.78 | 76.69 | |
|---|--|--|---|---|--|---|--|---|--|--|
| 1069.15 | | 1072.42 | | 1075.69 | | 1082.24 | | 1085.51 | 77.08 | |
| 1092.06 | | 1095.33 | | 1101.88 | | 1105.15 | | 1121.52 | 79.43 | |
| 1141.16
1203.35 | | 1157.52
1213.16 | | 1177.16 | | 1183.71
1226.26 | | 1190.25
1242.62 | 84.08
84.3 | |
| 1268.81 | | 1298.27 | | 1308.09 | | 1350.64 | | 1357.18 | 83.78 | |
| 1396.46 | | 1406.28 | | 1419.37 | | 1458.65 | 84.1 | | 83.9 | |
| 1511.02 | | 1547.02 | | 1566.66 | | 1576.48 | | 1596.12 | 83.39 | |
| 1641.94 | | 1664.86 | | 1717.23 | | 1733.59 | | 1749.96 | 82.94 | |
| 1779.42 | 82.84 | 1799.05 | 82.59 | 1831.79 | 82.41 | 1848.15 | 82.66 | 1897.28 | 82.39 | |
| 1910.4 | | 1933.36 | | 1939.91 | | 1989.11 | | 2038.3 | 82.16 | |
| 2074.38 | | 2097.33 | | 2120.29 | | 2146.53 | | 2153.09 | 82.04 | |
| 2176.04 | | 2228.52 | | 2261.32 | | 2290.83 | | 2307.23 | 83.27 | |
| 2323.63 | | 2333.47 | | 2385.94 | | 2399.06 | | 2454.81 | 83.52 | |
| 2484.33
2651.59 | | 2540.09
2717.19 | | 2582.72 | | | | 2638.48
2769.66 | 83.73 | |
| 2815.58 | | 2835.25 | | 2723.75
2871.33 | | 2743.42
2884.45 | | 2920.52 | 84.25
84.27 | |
| 2969.72 | | 3002.52 | | 3032.03 | | 3077.95 | | 3091.07 | 84.36 | |
| 3114.02 | | 3123.86 | | 3159.94 | | 3179.62 | | 3225.53 | 83.78 | |
| 3264.89 | | 3271.45 | | 3284.57 | | | 83.79 | | 83.55 | |
| 3422.31 | | 3435.43 | | 3464.95 | | 3481.34 | 82.41 | | 82.11 | |
| 3514.14 | | 3543.66 | 81.38 | | | 3602.69 | 80.66 | 3628.93 | 80.54 | |
| 3651.89 | 80.03 | 3661.73 | 80.11 | 3694.52 | 79.89 | 3714.2 | 79.95 | 3737.16 | 79.77 | |
| 3773.23 | | 3786.35 | | 3809.31 | | 3835.55 | | 3865.06 | 79.85 | |
| 3871.62 | | 3907.7 | | 3973.29 | | 3986.41 | | 4006.09 | 80.58 | |
| 4032.33 | 80.81 | | | 4117.6 | | 4163.51 | | 4176.63 | 82.47 | |
| 4186.47 | | 4193.03 | | 4202.86 | | | | 4222.54 | 84.74 | |
| 4225.82 | | 4248.78 | | 4255.34 | | | | 4288.13 | 85.07 | |
| 4297.97
4376.68 | | 4307.81
4432.43 | | 4324.21 | | 4347.16
4507.86 | | 4360.28
4530.82 | 83.83
83.9 | |
| 4586.57 | | 4596.41 | | 4678.4 | | 4701.35 | | 4714.47 | 84.03 | |
| 4730.87 | | 4737.43 | | 4757.11 | | 4773.51 | | 4806.3 | 85.63 | |
| 4812.86 | | 4825.98 | | 4839.1 | | 4862.05 | | 4901.41 | 84.15 | |
| 4950.6 | | 4989.96 | | 5045.71 | | 5071.94 | | 5147.37 | 83.75 | |
| 5170.33 | | 5212.96 | 83.61 | 5239.2 | | 5275.28 | | 5281.84 | 83.59 | |
| 5321.19 | | 5350.71 | | 5360.54 | | 5413.02 | | 5445.81 | 83.54 | |
| 5498.29 | | 5521.24 | | 5531.08 | | 5547.48 | 83.62 | | 83.79 | |
| 5593.39 | | 5603.23 | | 5649.15 | | 5658.98 | | 5688.5 | 83.5 | |
| 5708.18 | | 5724.57 | | 5773.77 | | 5819.68 | | 5855.76 | 83.51 | |
| 5911.51 | | 5927.91 | | 5963.98 | | 6045.97 | | 6059.09 | 84.09 | |
| 6075.49 | 83.85 | 6105 | | 6144.36 | | 6200.11 | | 6209.95 | 83.56 | |
| 6252.58 | | 6262.42 | | 6295.22
6400.16 | | 6314.89 | | 6334.57 | 81.85
79.8 | |
| 6350.97
6488.71 | 82.02 | 6377.2
6888.81 | | 6895.37 | | 6439.52
6918.33 | | 6465.75
6944.57 | 84.44 | |
| 6964.24 | | 6967.52 | | 6993.76 | | 7026.56 | | 7036.39 | 86.35 | |
| 7059.35 | | 7072.47 | | 7075.75 | | 7082.31 | | 7085.59 | 86.72 | |
| 7095.43 | | 7108.54 | | 7128.22 | | 7138.06 | | 7157.74 | 86.18 | |
| 7193.81 | | 7223.33 | 85.98 | | | 7275.8 | | 7324.99 | 85.76 | |
| 7364.35 | | 7393.86 | | 7416.82 | 85.35 | 7446.34 | 85.28 | 7452.9 | 85.52 | |
| 7459.46 | | 7466.01 | 85.39 | 7488.97 | 85.54 | 7515.21 | 84.97 | 7521.77 | 85.08 | |
| 7544.72 | | 7567.68 | | 7669.35 | | 7718.54 | | 7731.66 | 86.23 | |
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Sta
1033.14
f Contr. | 83.59
83.74
83.49
83.82
84.51
92.4
87.74
n Val
.07 | Right OB
0.066
1780.35
80342.62
92514.83
74772.36
8505.79
0.93
9.45
8076273.0 |
| 9289.36
9354.94
9420.53
9482.84
9535.31
9686.15
Manning's
Sta
0
1213.16
Bank Sta:
7
Ineffecti
Sta L
0
1213.16
Left Leve | 84.54
84.25
83.51
83.17
89.91
91.87
93.06
n Valu
n Val
.085
.066
Left
70.97 1:
ve Flow
Sta R
770.97
9718.95
e | 9240.17
9309.03
9361.5
9430.37
9486.12
9541.86
9692.71
es
Sta
6.56
Right
213.16
num=
Elev
83.65
84.81
Station=
Station= | 83.53
85.2
83.83
84.03
83.66
90.75
87.79
93.98
num=
n Val
.066
Lengths | 9246.73
9318.87
9377.9
9450.04
9450.95
9545.14
9709.11
6
Sta
770.97
s: Left
439.55
2
ent | 2 83.87
84.95
7 84.06
8 84.45
8 82.79
5 91.77
8 87.27
93.3
n Val
7 .07
Channel
1691.6 | 9194.26
9259.84
9338.55
93394.3
9463.16
9502.51
9666.48
9718.95
Sta
843.14
Right
1780.35 | 83.98
83.52
83.92
84.26
83.94
83.12
91.52
87.27
91.56
n Val | 9210.66
9272.96
9348.39
9410.69
9469.72
9532.03
9676.32
Sta
1033.14
f Contr. | 83.59
83.74
83.49
83.82
84.51
92.4
87.74
n Val
.07 | Right OB
0.066
1780.35
80342.62
92514.83
74772.36
8505.79
0.93
9.45
8076273.0 |
| 9289.36
9354.94
9420.53
9482.84
9535.31
9686.15
Manning's
Sta
0
1213.16
Bank Sta:
7
Ineffecti
Sta L
0
1213.16
Left Leve | 84.54
84.25
83.51
83.17
89.91
91.87
93.06
n Valu
n Val
.085
.066
Left
70.97 1:
ve Flow
Sta R
770.97
9718.95
e | 9240.17
9309.03
9361.5
9430.37
9486.12
9541.86
9692.71
es
Sta
6.56
Right
213.16
num=
Elev
83.65
84.81
Station=
Station= | 83.53
85.2
83.83
84.03
83.66
90.75
87.79
93.98
num=
n Val
.066
Lengths | 9246.73
9318.87
9377.9
9450.04
9450.95
9545.14
9709.11
6
Sta
770.97
s: Left
439.55
2
ent | 2 83.87
84.95
7 84.06
8 84.45
8 82.79
5 91.77
8 87.27
93.3
n Val
7 .07
Channel
1691.6 | 9194.26
9259.84
9338.55
93394.3
9463.16
9502.51
9666.48
9718.95
Sta
843.14
Right
1780.35 | 83.98
83.52
83.92
84.26
83.94
83.12
91.52
87.27
91.56
n Val | 9210.66
9272.96
9348.39
9410.69
9469.72
9532.03
9676.32
Sta
1033.14
f Contr. | 83.59
83.74
83.49
83.82
84.51
92.4
87.74
n Val
.07 | Right OB
0.066
1780.35
80342.62
92514.83
74772.36
8505.79
0.93
9.45
8076273.0
8515.81
0.05
0.05 |
| 9289.36
9354.94
9420.53
9482.84
9535.31
9686.15
Manning's
Sta
0
1213.16
Bank Sta:
7
Ineffecti
Sta L
0
1213.16
Left Leve | 84.54
84.25
83.51
83.17
89.91
91.87
93.06
n Valu
n Val
.085
.066
Left
70.97 1:
ve Flow
Sta R
770.97
9718.95
e | 9240.17
9309.03
9361.5
9430.37
9486.12
9541.86
9692.71
es
Sta
6.56
Right
213.16
num=
Elev
83.65
84.81
Station=
Station= | 83.53
85.2
83.83
84.03
83.66
90.75
87.79
93.98
num=
n Val
.066
Lengths | 9246.73
9318.87
9377.9
9450.04
9450.95
9545.14
9709.11
6
Sta
770.97
s: Left
439.55
2
ent | 2 83.87
84.95
7 84.06
8 84.45
8 82.79
5 91.77
8 87.27
93.3
n Val
7 .07
Channel
1691.6 | 9194.26
9259.84
9338.55
93394.3
9463.16
9502.51
9666.48
9718.95
Sta
843.14
Right
1780.35 | 83.98
83.52
83.92
84.26
83.94
83.12
91.52
87.27
91.56
n Val | 9210.66
9272.96
9348.39
9410.69
9469.72
9532.03
9676.32
Sta
1033.14
f Contr. | 83.59
83.74
83.49
83.82
84.51
92.4
87.74
n Val
.07 | Right OB
0.066
1780.35
80342.62
92514.83
74772.36
8505.79
0.93
9.45
8076273.0
8515.81
0.05
0.05
39898.55
6470.90 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 134.33*

| REACH: Lo | wer Read | ch | RS: 134 | 1.33* | | | | | |
|--------------------|------------------|--------------------|----------------|--------------------|-------------------|--------------------|----------------|--------------------|----------------|
| INPUT | | | | | | | | | |
| Descripti | | | | 4.50 | | | | | |
| Station E
Sta | levation
Elev | | num=
Elev | 460
Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 93.24 | | 7.15331 | 17.74 | 97.87 | 22.96 | 98.01 | 33.34 | 95.97 |
| 40.26 | 94.89 | 65.34 | 92.62 | 76.59 | 91.4 | 85.23 | 91.16 | 95.61 | 90.33 |
| 106.85 | 89.13 | 149.33 | 84.98 | 179.08 | 82.81 | 201.37 | 81.9 | 229.66 | 81.86 |
| 286.75
367.18 | 81.88
81.49 | 324.8
387.93 | 82.17
80.94 | 336.04
409.56 | 81.92
80.99 | 341.23
424.26 | 81.35
80.8 | 345.56
446.67 | 82.3
80.9 |
| 564.37 | 81.02 | 577.34 | 81.07 | 580.8 | 81.87 | 585.99 | 82.02 | 638.74 | 81.96 |
| 645.66 | 82.09 | 673.34 | 82.13 | 695.82 | 82.05 | 771.93 | 82.13 | 797.88 | 82.09 |
| 815.17 | 81.96 | 819.5 | 81.54 | 833.34 | 81.78 | 865.33 | 81.89 | 892.14 | 81.71 |
| 922.43
1013.22 | 82.13 | 943.17
1020.14 | 81.73 | 973.44
1057.33 | 81.64
82.29 | 978.63
1070.3 | 81.97 | 985.55
1091.93 | 81.7
82.35 |
| 1118.74 | | 1128.25 | | 1141.22 | | 1170.63 | | 1212.14 | 82.31 |
| 1217.33 | 82.66 | 1228.58 | 82.78 | 1264.9 | 82.55 | 1303.82 | | 1323.84 | 82.28 |
| 1338.7 | | 1353.57 | 80.46 | 1361 | | 1390.73 | | 1398.16 | 79.9 |
| 1420.58
1554.28 | | 1442.77
1576.57 | | 1465.07
1591.43 | | 1531.98
1598.87 | 82.75 | 1539.41
1606.3 | 72.83
82.98 |
| 1658.96 | | 1681.41 | | 1687.45 | | 1691.77 | | 1717.6282 | |
| 1734.08 | | 1740.12 | 83.38 | 1746.1 | | 1758.07 | | 1767.05 | 79.38 |
| 1773.03
1805.96 | | 1782.02
1814.11 | 79.44 | 1791 | | 1793.99
1823.92 | | 1799.98
1852.49 | 75.34
59.13 |
| 1863.44 | | | | 1889.89 | | 1908.14 | | 1916.35 | 56.08 |
| 1926.39 | | 1944.63 | | 1955.22 | | 1964.07 | | 1965.46 | 62.62 |
| 1971.75 | 64.17 | 1981.2 | | 1985.7869 | | | | 2000.11 | 73.33 |
| 2015.86
2037.91 | | 2019.01 2041.06 | | 2022.16 2047.36 | | 2028.46 2050.51 | | 2031.61 2066.26 | 73.54
75.6 |
| 2068.88 | 75.64 | 2041.00 | | 2047.30 | | 2085.28 | | 2100.20 | 78.71 |
| 2119.81 | | 2126.12 | | 2132.41 | | 2145.02 | | 2154.46 | 84.66 |
| 2165.86 | | 2180.09 | | 2202.87 | 84.19 | 2228.5 | | 2237.04 | 84.02 |
| 2274.05
2413.56 | | 2279.74
2444.87 | 83.73
83.5 | 2313.91
2470.5 | 83.57 | 2368
2487.58 | | 2405.02
2527.44 | 83.76
83.14 |
| 2547.38 | | | | 2607.16 | 82.78 | 2621.4 | | 2647.03 | 82.74 |
| 2664.1 | | 2692.58 | | 2706.81 | | 2749.55 | | 2760.96 | 82.41 |
| 2829.43 | | 2872.22 | 82.19 | 2903.6 | | 2923.56 | | 2943.54 | 82.11 |
| 2966.36
3106.15 | | 2972.07
3174.61 | | 2992.03
3194.55 | 82.77 | 3037.68
3260.2 | 82.81
83.78 | 3066.21
3308.7 | 83
83.84 |
| 3345.78 | | 3377.17 | | 3394.29 | | 3405.69 | | 3462.75 | 84.05 |
| 3468.46 | 84.2 | 3485.57 | 84.09 | 3508.39 | | 3548.34 | | 3565.45 | 84.14 |
| 3596.83 | | 3608.25 | | 3639.62 | | 3682.42 | | 3710.95 | 84.26 |
| 3736.62
3847.88 | 84.18
83.94 | 3776.56
3865 | | 3787.98
3904.94 | | 3807.94
3939.17 | 84.15 | 3816.5
3944.88 | 84.23
83.55 |
| 3956.29 | | 3979.11 | | 4036.17 | | 4076.11 | 83.21 | 4113.2 | 82.59 |
| 4127.45 | | 4181.66 | | 4204.49 | | 4233.01 | | | 81.06 |
| 4275.81 | | 4284.37 | | 4312.89 | | 4330.01 | | 4349.98 | 80.41 |
| 4381.36
4498.33 | | 4392.77
4555.38 | | 4412.74
4566.79 | | 4435.57
4583.91 | | 4466.94
4606.74 | 80.58
81.25 |
| 4652.38 | | 4680.91 | | 4720.85 | | 4732.26 | | 4740.82 | 84.51 |
| 4746.52 | | 4755.07 | | 4763.63 | | 4775.05 | | 4795.02 | 84.38 |
| 4806.43 | | 4829.25 | | 4837.81 | | 4846.37 | | 4860.63 | 83.83 |
| 4880.59 | | 4906.27
5088.85 | | 4954.77
5097.41 | | 4974.74
5168.73 | | 5020.38
5188.69 | 83.69 |
| 5040.35
5200.1 | | 5214.37 | | 5237.19 | | 5251.46 | | 5279.98 | 83.97
85.2 |
| 5285.69 | 85.09 | 5297.1 | | 5308.51 | | 5328.48 | | 5362.71 | 83.96 |
| 5405.5 | | 5439.74 | | 5488.23 | | 5511.05 | | 5576.66 | 83.61 |
| 5596.64 | | 5633.72 | | 5656.54 | | 5687.93 | | 5693.63 | 83.46 |
| 5727.86
5950.38 | 83.61 | 5807.74
5973.2 | | 5836.26
6013.14 | | 5881.91
6021.69 | | 5901.88
6047.37 | 83.35
83.36 |
| 6121.54 | | 6161.48 | | 6192.86 | | 6241.36 | | 6255.62 | 83.54 |
| 6287 | | 6358.32 | | 6369.73 | 83.82 | 6384 | | 6409.66 | 83.81 |
| 6443.9 | 83.76 | 6492.4 | | 6500.96 | | 6538.04 | 83.11 | 6546.6 | 83.19 |
| 6575.13
6666.41 | | 6592.24
6700.65 | | 6609.36
6723.47 | | 6623.62
6743.44 | | 6646.44
7091.47 | 81.61
79.86 |
| 7097.17 | | 7117.15 | | 7139.97 | | 7157.08 | | 7159.93 | 84.97 |
| 7182.76 | 85.7 | 7211.29 | 85.77 | 7219.84 | 85.62 | 7239.81 | 85.64 | 7251.23 | 85.19 |
| 7254.08 | | 7259.78 | | 7262.64 | 85.92 | 7271.2 | 85.3 | 7282.6 | 85.5 |
| 7299.72
7399.56 | | 7308.28
7428.09 | 85.37
85.21 | 7325.4
7470.88 | | 7356.77
7505.12 | | 7382.45
7530.79 | 85.29
84.96 |
| 7550.76 | | | | 7582.15 | | 7587.85 | | 7593.55 | 84.78 |
| 7613.52 | 84.91 | 7636.35 | 0/1/2 | 7642 05 | 84.52 | 7662.02 | 84.28 | 7681.99 | 84.42 |
| 7770.43 | | 7813.21 | 84.4 | 7824.63 | | 7838.89 | | 7847.44 | 85.3 |
| 7858.86
7947.29 | | 7884.53
7955.85 | 04.1 | /913.91 | | 7924.47
7984.38 | | 7938.73
7992.94 | 84.1
84.54 |
| 8001.5 | | | | | | 8032.87 | | 8038.58 | 84.52 |
| 8049.99 | 84.5 | | | 8075.67 | | 8095.63 | | 8104.19 | 84.07 |
| 8118.46 | | 8132.72 | 83.55 | 8144.13 | | 8152.69 | 83.48 | 8172.66 | 83.74 |
| 8192.63
8309.58 | 83.54 | | | 8275.35
8346.66 | | 8281.06
8355.22 | 85.7
85.04 | 8292.47
8363.78 | 84
85.01 |
| 8372.34 | 84.28 | 8386.6 | 84.02 | 8346.66
8417.98 | | 8429.39 | | 8446.5 | 83.74 |
| 8455.06 | | 8463.62 | 83.73 | 8477.88 | | | | 8500.71 | 83.64 |
| 8509.26 | | | | | | 8532.08 | | 8546.34 | 83.81 |
| 8552.04
8617.66 | 83.56 | | | | | 8586.27
8649.03 | | 8600.54
8657.59 | 83.5
83 |
| 8671.85 | | 8686.12 | 84.08 | 8694.67 | | 8706.09 | | 8714.64 | 83.36 |
| 8726.05 | 83.56 | 8743.17 | 83.49 | 8748.87 | 83.29 | 8780.25 | 83.82 | 8785.96 | 83.41 |
| 8794.51 | | | | 8817.33 | | 8831.59 | | 8840.15 | 83.58 |
| 8854.42
8974.22 | | | | 8897.2
8988.49 | | 8922.87
9008.45 | | 8954.25
9017.01 | 83.23
83.7 |
| | | | | | | 9008.45 | | 9017.01 | 83.19 |
| 9111.15 | 83.26 | 9128.26 | 84.05 | 9136.82 | 84.61 | 9153.92 | 83.55 | 9165.34 | 83.4 |
| 9179.6 | 83.83 | 9196.71 | 83.48 | 9222.39 | 83.85 | 9230.95 | 83.21 | 9256.62 | 84.02 |
| 9270.89
9330.78 | | 9285.14
9336.49 | 83.5 | 9293.7
9347.9 | | 9302.26
9359.31 | 83.37
90 40 | 9319.37
9365.01 | 82.66
90.52 |
| 9390.69 | | | | | | | | 9502.73 | 88.03 |
| 9510.93 | | | | | | 9538.26 | | 9546.46 | 91.61 |
| M | | | | - | | | | | |
| Manning's
Sta | n Value
n Val | | num=
n Val | 6
Sta | n Val | Sta | n Val | Sta | n Val |
| 0 | .085 | 14.81 | .066 | 1740.12 | | 1814.11 | | | .07 |
| 2154.46 | .066 | | | | | | | | |
| Danle Ott. | Tef+ | Diah+ | Length | Toft of | anno ³ | Diabt | 0 | F Cont | Funa- |
| DallK Sta: | TELL | KTAIIL | renatus | s: Left Cha | amel | KTAIIE | coeri | contr. | Expan. |

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 134.02*

| INPUT | |
|--------------|--|
| Description: | |

| INPUT | | | | | | | | | |
|--------------------|-------------------|---------------------|----------------|----------------------|----------------|--------------------|----------------|--------------------|----------------|
| Descript: | ion:
Elevatior | n Data | num= | 460 | | | | | |
| Station | | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 90.9 | 8.95 | 92.92 | 23.0597 | | 25.35 | 97.87 | 32.8 | 97.98 |
| 44.94
77.29 | 95.18
90.21 | 48.98
92.12 | 93.93
89.58 | 54.38
98.86 | 93.19
89.49 | 59.77
102.9 | 91.79
89 | 70.55
112.34 | 91.04
89.08 |
| 116.38 | 88.74 | 129.86 | 89.5 | 146.04 | 89.2 | 182.44 | 87.22 | 229.76 | 84.76 |
| 248.49
435.87 | 83.95
82.33 | 290.28
443.95 | 82.7
82.17 | 310.89
466.87 | 82.33
82.53 | 354.98
484.39 | 82.26
82.59 | 410.25
499.22 | 82.37
82.3 |
| 503.27 | 82.64 | 515.4 | 82.42 | 522.14 | 81.99 | 528.88 | 81 | 535.62 | 82.91 |
| 543.71 | 82.78 | 554.49 | 81.8 | 563.93 | 81.64 | 569.32 | 81.28 | 574.71 | 81.68 |
| 580.1
693.22 | 80.83
80.17 | 601.67
741.87 | 80.22
80.16 | 628.63
756.7 | 80.25
80.27 | 635.37
826.79 | 80.41
80.35 | 658.29
864.54 | 80.07
80.59 |
| 876.67 | 80.51 | 883.41 | 80.91 | 896.89 | 80.63 | 903.63 | 82.44 | 992.6 | 82.28 |
| 1003.38
1101.79 | | 1020.91
1170.54 | | 1033.04
1177.27 | | 1046.52
1250.07 | | 1081.57
1267.59 | 82.46
82.22 |
| 1271.64 | | 1295.9 | | 1314.77 | | 1324.21 | | 1345.78 | 81.92 |
| 1366 | | 1380.82 | 81.7 | 1387.56 | 81.48 | 1410.48 | 81.76 | 1421.27 | 82.13 |
| 1434.76
1514.28 | | 1438.79
1522.37 | | 1452.27
1533.15 | 81.98 | 1467.1
1552.02 | 81.46
81.38 | 1498.1
1576.28 | 81.28
81.55 |
| 1587.07 | 82.02 | 1608.64 | 82.09 | 1611.33 | 82.23 | 1645.03 | 82.29 | 1659.86 | 82.6 |
| 1672
1755.57 | | 1698.95
1775.79 | | 1707.04
1785.23 | | 1717.83
1796.01 | | 1740.74
1821.63 | 82.74
82.13 |
| 1875.55 | | 1886.33 | | 1894.42 | | 1911.95 | | 1945.65 | 82.81 |
| 1968.57 | | 2029.23 | | 2060.23 | 82.46 | 2083.6 | | 2106.77 | 80.95 |
| 2118.35
2240.87 | | 2143.81
2250.31 | | 2166.73
2285.36 | | 2176.27
2331.12 | | 2208.52
2337.85 | 77.81
74.44 |
| 2363.42 | | 2378.22 | 74.53 | 2396.43 | 74.84 | 2415.9 | 75.93 | 2449.54 | 78.72 |
| 2477.52 | | 2488.57 | | 2496.64 | | 2512.79
2633.91 | | 2582.77 | 82.51 |
| 2596.23
2658.13 | | 2617.76
2674.248 | 32.09964 | 2627.18
2699.85 | | 2709.27 | | 2644.67
2714.68 | 81.84
82.49 |
| 2725.5 | | 2739.02 | | 2747.14 | | 2755.26 | | 2757.96 | 77.91 |
| 2763.37
2820.73 | | 2771.48
2841.92 | | 2778.2967
2861.14 | | 2806.16 | | 2810.84
2877.63 | 59.96
56.1 |
| 2894.12 | | 2904.3 | | 2912.81 | | 2914.14 | | 2920.19 | 62.51 |
| 2929.27
2977.7 | | | 68.2319 | | | 2968.62 | | 2974.68 | 70.58
71.82 |
| 3013.64 | | 2983.76
3021.46 | | 2992.84
3029.28 | 76.54 | 2995.87
3037.1 | 77.47 | 3013.52
3044.3 | 77.91 |
| 3062.47 | | 3068.53 | | 3074.57 | | 3095.76 | 84.52 | 3105.45 | 84.07 |
| 3136.93
3231.35 | | 3158.72
3277.36 | | 3165.98
3308.83 | | 3197.46
3316.09 | 83.62 | 3202.3
3342.72 | 83.69
83.39 |
| 3364.52 | | 3379.04 | | 3412.94 | | 3429.89 | 82.87 | 3468.63 | 82.86 |
| 3480.73 | | 3514.63 | | 3529.15 | | 3553.37 | | 3565.47 | 82.53 |
| 3601.82
3749.8 | | 3611.52
3786.19 | | 3669.75
3791.04 | | 3706.13
3808.02 | | 3732.82
3846.84 | 82.06
82.72 |
| 3871.1 | 82.87 | 3905.06 | 82.98 | 3980.24 | 83.05 | 4034.25 | 83.86 | 4077.31 | 83.91 |
| 4108.85
4295.65 | | 4159.79
4322.34 | | 4227.72
4395.12 | | 4247.13
4419.38 | 84.2
84.21 | 4281.1
4441.21 | 84.2
84.13 |
| 4475.18 | | 4484.88 | | | | 4535.83 | | 4550.38 | 84.05 |
| 4584.34 | | 4613.46 | | 4647.42 | | 4695.94 | 83.63 | 4729.9 | 83.32 |
| 4761.45
4882.74 | | 4773.57
4899.73 | 81.24 | 4819.67
4962.8 | | 4839.08
4989.48 | | 4863.33
4999.19 | 81.67
81.2 |
| 5035.58 | 81.03 | 5062.27 | | 5088.95 | 81.17 | 5137.47 | 81.39 | 5147.18 | 81.34 |
| 5161.73
5295.16 | | 5219.96
5300.02 | | 5244.22
5307.29 | | 5278.18
5314.57 | | 5287.89
5324.27 | 82.78
84.46 |
| 5341.26 | | 5350.96 | 85.21 | 5370.36 | 84.49 | 5377.64 | 83.85 | 5414.03 | 83.58 |
| 5435.87 | 83.56 | 5477.1 | | 5494.09 | 83.79 | 5532.9 | | 5549.88 | 83.67 |
| 5591.12
5753.66 | 83.64
84.78 | 5598.4
5768.22 | | 5685.73
5777.92 | 83.79 | 5717.27
5794.9 | | 5729.41
5824.02 | 84.43
83.78 |
| 5860.4 | | 5889.52 | 83.69 | 5930.76 | | 5950.16 | 83.57 | 6005.96 | 83.47 |
| 6022.94
6226.72 | | 6073.88
6265.54 | | 6100.57
6282.51 | | 6134.53
6323.76 | | 6202.46
6343.16 | 83.12
83.44 |
| 6406.24 | 83.21 | 6469.31 | 83.17 | 6503.27 | 83.24 | 6529.96 | 83.19 | 6571.2 | 83.44 |
| 6583.33
6714.33 | | 6610.01
6743.44 | | 6670.66
6784.68 | 83.44 | 6680.37
6823.5 | 83.54 | 6692.5
6830.77 | 83.38
83.02 |
| 6869.59 | | 6884.15 | | 6896.28 | | 6915.68 | | 6932.66 | 81.27 |
| 6961.78 | | 6981.18 | | 6998.17 | | 7294.12 | | 7298.98 | 80.42 |
| 7315.96
7420.28 | | 7335.37
7437.26 | 84.46 | 7352.35
7439.69 | 84.38 | 7371.76
7446.96 | 84.95 | 7396.02
7456.66 | 85.01
84.79 |
| 7478.5 | 84.68 | 7493.06 | 84.75 | 7519.74 | 84.57 | 7541.57 | 84.61 | 7556.12 | 84.46 |
| 7580.39
7706.54 | | 7616.77
7716.24 | | 7645.89
7721.09 | | 7667.72
7738.07 | 84.33 | 7684.7
7757.48 | 84.16
83.89 |
| 7779.31 | | 7796.29 | 83.87 | 7871.5 | | 7907.89 | | 7917.59 | 84.69 |
| 7929.72 | | 7937 | 84.56 | 7946.7 | | 7968.54 | | 7995.22 | 83.6 |
| 8002.5
8053.44 | | 8014.63
8060.72 | 83.59 | 8021.91
8068 | 83.77 | 8029.19
8077.7 | | 8043.74
8084.98 | 83.81
83.78 |
| 8094.68 | 84.14 | 8109.24 | 83.9 | 8114.09 | 83.61 | 8131.07 | 83.68 | 8148.05 | 83.4 |
| 8167.46
8230.54 | | 8179.59
8254.79 | 83.12 | 8189.3
8300.88 | | 8196.58
8315.44 | | 8213.55
8329.99 | 83.28
83.23 |
| 8349.4 | | 8361.53 | 83.73 | 8368.8 | | 8376.08 | | 8383.36 | 83.68 |
| 8395.49 | | 8422.17 | | 8431.87 | | 8446.43 | | 8453.71 | 83.82 |
| 8460.98
8531.33 | | 8473.11
8536.18 | | 8480.39
8543.46 | | 8492.52
8555.59 | | 8499.79
8565.29 | 83.49
83.5 |
| 8577.42 | 83.03 | 8591.98 | 82.88 | 8604.1 | 83.09 | 8611.38 | 82.97 | 8618.66 | 83.2 |
| 8625.94
8684.15 | | 8638.06
8703.55 | | 8650.19
8730.24 | 83.48
83.27 | 8657.47
8735.1 | | 8674.45
8742.37 | 82.91
82.96 |
| 8752.07 | 83.52 | 8761.78 | 82.96 | 8773.9 | | 8793.31 | 82.86 | 8810.29 | 83.05 |
| 8829.7 | 82.79 | 8851.53 | 83 | 8878.21 | 82.85 | 8907.32 | 83.19 | 8924.3 | 83.03 |
| 8931.58
8999.5 | 83.24
82.87 | 8943.7
9011.63 | | 8958.26
9033.46 | | 8970.39
9048.01 | | 8992.22
9057.72 | 83.1
83.06 |
| 9069.85 | 83.41 | 9084.4 | 83.14 | 9106.23 | 83.44 | 9113.51 | 82.93 | 9135.34 | 83.59 |
| 9147.47
9198.41 | 83.26
82.75 | 9159.6
9203.26 | | 9166.88
9212.97 | | 9174.15
9222.67 | 83.09
89.21 | 9188.7
9227.52 | 82.52
89.51 |
| 9249.35 | 92.21 | 9251.54 | 91.86 | 9255.91 | 89.14 | 9258.09 | 88.79 | 9338.99 | 88.79 |
| 9345.55 | 89.11 | 9352.1 | 92.65 | 9356.47 | 93.27 | 9367.41 | 92.81 | 9373.97 | 91.65 |
| | | | | _ | | | | | |

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Sta n Val Sta
32.8 .066 2709.27
                                                                 n Val
                 .085
                              32.8
                                                                      .07 2778.29
                                                                                             .025 2938.42
 3095.76
Bank Sta: Left Right 2709.27 3095.76
                         Right
                                        Lengths: Left Channel
                                                                            Right
                                                                                             Coeff Contr.
                                         439.55 1691.6 1780.35
2
Ineffective Flow
Sta L Sta R
                           Elev Permanent
   Sta L Sta R
0 2709.27
                               83.1
 3095.76 9373.97
                     Station=
                                           32.8
                                                                              97.98
Left Levee
                                                           Elevation=
Right Levee
                        Station=9249.354
                                                           Elevation=92.21333
CROSS SECTION
RIVER: Rio Grande
                                        RS: 133.70*
REACH: Lower Reach
Description:
Station Elevation Data
                                        num=
                Elev
88.56
                            Sta
3.88
                                          Elev
89.61
                                                      Sta
11.63
                                                                                           Elev
95.08
       Sta
                                                                    Elev
                                                                               Sta
25.2
                                                                  91.02
93.76
                                                                             64.62
103.08
                                                                                                        71.95
    32.95
                 97.87
                             42.65
                                          97.94
                                                      59.13
                                                                                             91.9
                                                                                                                     90.79
                               86.6
                           132.38
  123.22
                 86.16
                                          86.36
                                                    137.87
                                                                   85.82
                                                                             150.69
                                                                                            86.4 156.18
                                                                                                                     86.09
                86.56
86.5
                           174.49
269.72
                                          87.85
                                                    179.98
299.01
                                                                   87.64
                                                                             183.65
                                                                                            88
83.86
                                                                                                       196.47
                                          85.85
                                                                                                       350.29
   245.91
                                                                   84.88
                                                                              335.64
                83.44
82.71
    368.6
                             392.4
                                             83
                                                    399.73
                                                                   83.05
                                                                              425.36
                                                                                                       440.01
                                                       480.3
                                                                   82.65
                                                                                            82.75
                            469.31
                                                                              524.25
   452.84
                                                                                                       540.73
                82.81
83.03
                                         82.64
82.93
                                                    590.17
676.24
                                                                             601.16
681.73
                                                                                            82.47
83.11
   555.38
                            573.69
                                                                   82.72
                                                                                                       632.29
                                                                                                                     82.97
   707.37
                 82.13
                            711.03
                                           81.1
                                                     716.52
                                                                   80.64
                                                                              722.01
                                                                                            82.68
                                                                                                       725.68
                                                                                                                     83.51
                            736.67
771.46
                                         83.32
81.07
                                                                   82.5
81.68
                                                                             751.32
786.11
                                                                                            81.85
80.4
                                                                                                      760.47
798.93
   729.34
                81.61 771.46
79.49 822.73
79.48 892.32
79.79 1121.22
                                                     778.79
   764.13
                                                                                                                     80.15
                                                                   79.56 852.03
79.44 1026
79.83 1172.49
                                                                                           79.58 861.19
79.61 1077.27
  815 41
                                          79.82
                                                     828 22
                                          79.35
                                                   1005.85
 1095.58
                                          79.75 1139.53
                                                                                            80.12 1188.97
                                                                                                                         80
                 80.61 1209.12
                                                                   80.19 1225.59
                82.89 1291.52
83.01 1401.38
83.04 1522.25
                                                                   82.8 1346.45
82.99 1467.31
82.79 1553.38
                                          82.76 1304.34
82.82 1419.7
  1249.4
                                                                                            82.61
                                                                                                     1361.1
                                                                                                                     82.95
                                         82.82 1419.7
82.98 1544.22
                                                                                            82.86 1487.45
 1384.91
                                                                                            82.86 1588.17
 1494.78
                                                                                                                     82.78
                82.85 1646.76
82.48 1725.51
                                         82.79 1648.59
81.36 1729.17
                                                                   82.73 1696.21
81.22 1740.15
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81.62 1758.47
 1597 32
 1720.01
                81.72 1796.92
81.24 1914.11
  1784.1
                                          81.99 1826.22
                                                                   81.95 1853.68
                                                                                            81.49 1873.83
                                                                                                                     81.58
                                          81.63 1928.76
                                                                   82.19
                                                                                            82.28 1952.57
                81.95 1991.02
81.05 2066.1
81.27 2141.18
                                                                  81.06 2022.15
81.57 2080.75
81.96 2183.3
                                                                                           81.12 2033.14
81.13 2106.39
82.04 2186.96
 1970.88
                                          81.19 2007.51
                                                                                                                     80.95
                                         82 2069.76
81.53 2154
 2139.35
                                         81.53 2154
82.29 2252.88
82.19 2331.62
                                                                                                                     82.25
                                                                   82.72 2269.36
82.1 2362.75
                82.17 2232.73
81.82 2316.97
                                                                                           82.71 2285.84
82.67 2382.89
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                                                                                                                     82.23
                                         82.33 2410.36
81.77 2501.92
82.99 2637.44
 2395 72
                 82 51 2401 21
                                                                   82.61 2423.18
                                                                                            82.18 2437.83
                                                                                                                     82 27
                                                                  81.81 2545.88
82.85 2666.74
                 82.61 2595.32
 2571.51
                                                                                           82.84 2697.87
                                                                                                                     82.71
                                                                                           82.64 2816.9
81.24 2941.42
                                         82.74 2754.63
81.94 2859.97
                                                                   82.82 2796.75
81.45 2888.31
                 82.82 2750.97
 2828.49
                 82.31 2838.87
                                                                                                                     81.38
                                                                   79.08 3031.15
76.5 3208.61
79.7 3363.6
                                                                                                                     77.31
76.58
 2954.38
3102.56
                 81 19 2979 87
                                          80.04 2998.19
76.6 3173.87
                                                                                            77.98 3054.95
76.64 3228.71
                 76.52 3119.03
                                         77.61 3325.6
82.83 3440.77
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82.46 3550.45
 3246 99
                 76.71
                           3279 9
                 82.84 3411.52
                                                                   82.68 3524.86
                82.03 3566.9
81.13 3630.86
 3554.11
                                          82.41 3570.56
                                                                   81.54 3576.05
                                                                                            80.97 3590.67
                                                                                                                      81.3
                                       81.5599 3665.62
77.97 3721.93
                                                                   82.12 3678.42
77.4 3726.77
                                                                                            82.82 3683.25
75.19 3734.02
 3692.92
                 80.57 3719.51
                                                                                                                     71.08
 3742.4667.79562 3746.11
3796.96 57.03 3814.14
3853.38 56.08 3861.54
                                         66.99 3765
56.44 3820.77
                                                                   61.67 3769.18
56.03 3828.88
                                                                                           60.8 3778.03
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                                         55.99 3862.82
68.82 3915.09
                                                                   59.89 3868.62
68.47 3923.8
                                                                                           60.84 3877.33
66.46 3929.61
                                                                                                                      63 4
 3891.0666.10242 3909.28
                67.57 3941.23
71.31 3965.78
79.74 4010.93
                                          68.32 3955.9467.95394 3958.16
 3938.33
                                                                                                68 3958.28
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                                          72.19 3973.28
81.33 4016.74
                                                                  74.96 3980.79
82.48 4029.56
                                                                                            76.4 3987.7
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                84.03 4070.99
83.65 4218.63
82.76 4414.16
82.13 4606.02
                                         84.02 4094.93
83.52 4240.58
                                                                                            83.59 4148.8
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 4045.05
                                                                   83.87 4120.87
                                                                   83.28 4298.44
 4186.71
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                                         82.33 4424.14
82.26 4610.02
                                                                   82.46 4510.06
82.19 4624.01
                                                                                            82.24 4540.05
82.6 4656
 4344.33
                                                                                           82.24 4540.05
82.6 4656
83.99 4871.91
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84.1 5223.77
83.67 5383.7
82.17 5509.65
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 4562.04
                                         82.9 4810.43
84.1 4985.86
84.15 5145.8
                 82 83 4765 93
 4703 98
                                                                   83.96 4845.92
                                                                                                                      83 9
                84.02 4969.87
84.05 5127.81
                                                                  84.17 5025.85
84.09 5201.77
                                         84.15 5145.8
83.82 5315.73
83.07 5457.67
 5107.81
                                                                                                                     83.93
                84.01 5263.75
83.05 5419.68
                                                                   83.81 5355.72
82.54 5493.66
 5235.76
 5409.69
                                                                                                                      82.1
 5523.65
5719.56
                81.84 5575.62
81.92 5727.56
                                         81.69 5605.61
81.87 5755.55
                                                                   81.8 5619.61
82.14 5807.53
                                                                                             81.7 5653.59
                                                                                                                      81 7
                                                                                            82.44 5835.52
                                         81.87 5755.55
84.42 5859.5
84.74 5911.48
83.66 6045.42
84.1 6227.34
83.48 6339.3
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83.97 5895.49
83.57 6013.44
                                                                                            83.15 5873.5
83.72 5947.46
 5843 51
                                                                   84 06
                                                                    84.06 5865.5
84.2 5917.48
83.5 6059.42
                                                                             5865 5
                                                                                                                     84 18
 5999.44
                                                                                            83.56 6171.37
                                                                                                                     83.58
                83.66 6207.35
83.59 6315.3
83.33 6449.25
                                                                   84.35 6239.34
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83.38 6389.27
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83.15 6649.16
 6285.32
                                                                                                                     83.42
 6435.25
6597.18
                                                                   83.21 6513.22
83.18 6663.15
                                                                                            83.28 6541.21
83.1 6713.13
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                83.12 6787.09
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80.83 7496.78
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80.82 7514.78
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                                                                                            83.03 6901.05
83.22 7076.97
 6741 12
                                          83.03 6845.07
                                                                                                                     83 21
                                          83.14 7018.99
                                                                                           82.16 7222.91
82.15 7530.77
84.16 7614.73
 7114.95
                                          82.52 7158.93
                                                                                                                     81.06
                                         80.73 7500.78
84.21 7580.75
 7252.89
 7544.76
                                                                                                                     83.83
 7616.73
7762.67
                 84.33 7622.73
83.79 7786.66
                                          83.95 7642.72
83.65 7804.65
                                                                   84.09 7712.69
83.69 7836.64
                                                                                            83.81 7732.68
83.52 7862.62
                 83.34 7896.61
                                                                   83.33 7972.58
 7878.62
                                          83.25
                                                   7910.6
                                                                                            83.15 8002.56
                                                                                                                     83.29
                                          83.58 8026.55
                                                                   83.82 8034.55
                                                                                            83.28 8052.54
                 83.92 8020.56
 8080.53
                 83.19 8102.52
                                          83.08 8128.51
                                                                   83.33
                                                                            8134.5
                                                                                            82.94
                                                                                                     8142.5
                                                                                                                     83.32
                                         83.48 8172.49
82.7 8240.46
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82.9 8434.36
                83.21 8156.49
82.95 8226.46
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82.65 8254.45
 8216.47
                                                                                            82.81 8288.43
                                                                                                                     82.66
 8338.41
                82.93 8350.4
82.93 8426.37
                                                                   82.77 8382.39
82.69 8446.36
                                                                                            83.55 8394.38
82.75 8452.35
                                                                                                                     83.18
                                          83.03 8484.34
82.91 8554.3
                                                                                            82.92 8516.32
82.45 8588.28
 8458.35
                 82.74 8474.34
                                                                   82.67 8490.33
                                                                                                                     82.76
 8594 28
                 82 25 8604 27
                                          82 89 8614 27
                                                                   82 89 8620 27
                                                                                            82.61 8634.26
                                                                                                                     82 45
                                           82.4 8680.24
 8706.22
                 82.49 8716.21
                                          82.82 8732.21
                                                                   82.43
                                                                             8746.2
                                                                                            82.58 8762.19
                                                                                                                     82.39
 8780.18
                82.56 8802.17
82.34 8868.14
                                         82.46 8826.16
82.65 8878.13
                                                                  82.73 8840.15
82.52 8896.12
                                                                                           82.62 8846.15
82.71 8912.12
                                                                                                                     82.79
82.59
 8856.14
                                         82.8 8950.09
82.65 9014.06
 8930.11
                 83.42 8942.1
                                                                   82.72 8960.09
                                                                                            82.99 8972.08
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82.8 9058.04
                                                                                     82.56 9070.03
  9086.02
                     87.93 9090.02
89.79 9185.08
                                                     88.51 9108.02
                                                                                    92.12 9114.57
                                                                                                                     89.55 9175.24
                                                                                                                                                    89.55
Manning's n Values
                                                   n Val Sta
.066 3742.46
         Sta n Val
                                         Sta
                                                                                    n Val
                                                                                                                    n Val
                       .118 3678.42
                                                                                      .015 3955.94
                                                                                                                      .066 4037.07
Bank Sta: Left Right 3678.42 4037.07
                                                   Lengths: Left Channel Right 439.55 1691.6 1780.35
                                                                                                                      Coeff Contr.
                                                                                                                                                    Expan.
| 36/8.42 | 403/.07 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 20
403.07 9201.47 84.37 T

Left Levee Station= 42.65

Right Levee Station=9108.016

Blocked Obstructions num=

Sta L Sta R Elev

736.67 3389.58 82.72
                                                                          Elevation=
                                                                          Elevation=
                                                                                                  92.12
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                                   RS: 133.38*
INPUT
Description:
Station Elevation Data
                                                                     460
                                                   num=
         Sta
                       Elev
                                        Sta
                                                       Elev
                                                                        Sta
                                                                                      Elev
                                                                                                        Sta
                                                                                                                     Elev
                                                                                                                                        Sta
                                                                     14.31
                                                                                                    31.02
                                                                                                                                    39.5597.48146
                     86.21
                                                                                     89.13
                                                                                                                      94.2
                                                                                                                    89.86
83.06
      45.33
                     98.06
                                     52.49
                                                     97.91
                                                                     73.32
                                                                                     92.34
                                                                                                    80.26
                                                                                                                                    89.52
                                                                                                                                                    88.39
                      85.59
                                  108.03
                     82.99
83.43
    149.69
                                   154.32
                                                     82.75
                                                                   165.89
                                                                                     83.22
                                                                                                  172.84
                                                                                                                     82.64
                                                                                                                                  189.03
                                                                                                                                                    83.72
                                                                   205.24
246.89
                                                                                                 212.18 272.35
                                                                                                                    84.99
86.64
                                                                                                                                  219.12
                                                                                                                                  276.98
                      86.04
                                     230.7
                                                     86.58
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Bank Sta: Left Right 4647.56 4978.37
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Station=45.92667 Elevation=98.09334
Station=8966.677 Elevation=92.02666
                                                                                  Coeff Contr.
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Left Levee
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  Sta L Sta R Elev
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RIVER: Rio Grande
REACH: Lower Reach
                                   RS: 133.07*
TNPIIT
Description:
Station Elevation Data
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                                                           80.83 4957.62
 4898.98
                                                                                                       80.98
 5007.89
5158.71
              80.98 5021.86
82.75 5167.08
                                     81.25 5077.71
82.59 5175.46
                                                           81.67 5086.1
82.77 5186.63
                                                                                 81.86 5127.98
82.67 5208.97
                                                                                                       82.29
                                                                                 82.47 5345.82
 5220.14
               82.62 5253.66
                                     82.54
                                                 5276
                                                           82.62 5287.17
                                                                                                       82.37
                                     82.28 5421.22
                                                           81.76 5426.81
79.7 5482.66
                                                                                  81.5 5440.77
               82.26 5382.13
 5446.35
               82.11 5451.94
                                     80.66 5460.32
                                                                                 80.21 5491.04
                                                                                                       79.92
 5510.59
5572.03
              80.01 5518.97
80.77 5588.79
                                    80.36 5530.14
81.15 5597.17
                                                           80.51 5544.0980.50001 5566.44
                                                           81.19 5608.34
                                                                                 81.69 5616.71
                                                                                                       82.28
 5632.24
5690.46
              80.66 5649.87
62.14 5695.2
                                     76.37 5666.1669.76344 5682.69
61.03 5707.05 57.36 5718.9
                                                                                 63.23 5686.57
                                                                                                       62.33
                                                                                  56.3 5742.6
                                                                                                       55.36
                                                                                 57.51 5784.1
59.47 5831.95
 5753.08
               55.85
                          5759
                                     55.86 5760.17
                                                           57.16 5765.49
                                                                                                       59.48
  5796.3360.39533 5808.02
                                      60.2 5815.99
 5847 45
              60.35 5847.55
74.27 5881.89
                                    65.71 5850.99
77.07 5888.77
                                                           65 84 5854 42
                                                                                 67.27 5861.29
                                                                                                       71 81
                                                                                 81.42 5912.8
82.67 6124.31
                                     83.43 6005.42
 5919.67
               84.08 5983.69
                                                           83.36 6077.44
                                                                                                         82.3
              82.32 6220.48
84.15 6398.04
                                    82.26 6245.68
84.09 6463.33
                                                          82.32 6255.99
84.12 6498.85
                                                                                 82.44 6337.31
84.1 6533.21
 6362.81
                                                                                                       84.01
                                                           83.75 6711.91
83.1 6960.5
                                                                                 83.52 6771.48
83.73 6967.37
                                                                                                       83.05
 6587.05
               83.98 6622.56
                                     83.85 6675.26
```

```
83.64 6979.97
83.39 7078.48
82.96 7386.62
82.75 7642.07
81.6 7921.57
82.64 8120.89
                                                                                                                                                                                                                                                                                                                               83.46 7014.33
83.5 7194.18
82.75 7541.27
81.86 7762.35
82.68 7969.68
82.17 8196.49
                                                                                                                                                                                                                                           83.81 6997.15
                                                                                                                                                 83.33 7157.52
82.86 7453.06
82.68 7701.63
82.41 7938.75
                                                                                                                                                                                                                                         83.29 7174.7
82.87 7495.44
82.39 7745.17
82.72 7961.66
82.14 8191.91
                                                                                                                                                                                                                                                                                                                                                                                                                         83.21
82.71
81.76
     7052.14
7340.8
      7560.74
           7902.1
      7985.72
                                                                                                                                                   82.26 8174.73
                                                                                                                                                                                                                                                                                                                                                                                                                          82.38
                                                            82.08 8249.19
82.01 8320.21
                                                                                                                                                  82.05 8264.08
81.85 8355.72
                                                                                                                                                                                                                                          82.12 8267.51
81.81 8384.35
                                                                                                                                                                                                                                                                                                                                81.98 8280.11
81.87 8400.39
                                                                                                                                                                                                                                                                                                                                                                                                                          82.15
81.8
      8289.28
    8299.28 82.05 8422.15
8502.33 81.75 8514.93
8610 81.56 8650.09
8730.27 82.05 8771.5
8825.34 91.93 8827.52
                                                                                                                                                81.83 8453.08
81.58 8536.69
81.69 8675.29
82.3 8796.7
91.08 8847.75
                                                                                                                                                                                                                                          81.74 8462.24
81.71 8567.62
                                                                                                                                                                                                                                                                                                                                  81.83 8486.29
                                                                                                                                                                                                                                                                                                                                81.52 8590.53
81.93 8723.4
82.43 8809.4
                                                                                                                                                                                                                                       81.88 8713.09
82.12 8803.57
91.08 8851.03
                                                                                                                                                                                                                                                                                                                                                                                                                          82.24
                                                                                                                                                                                                                                                                                                                                92.04 8856.49
 Manning's n Values
                                                                                                                                              num=
                          Sta n Val Sta
0 .118 5544.09
                                                                                                                                           n Val Sta n Val Sta
.066 5666.16 .015 5796.33
                                                                                                                                                                                                                                                                                                                              n Val Sta
.066 5919.67
                                                                 eft Right Lengths: Left Channel Right
.71 5919.67 439.55 1691.6 1780.35
Station=54.12834 Elevation=98.10667
Station=8825.338 Elevation=91.93333
 Bank Sta: Left Right 5616.71 5919.67
                                                                                                                                                                                                                                                                                                                                      Coeff Contr.
                                                                                                                                                                                                                                                                                                                                                                                                                          Expan.
Left Levee
Right Levee
| Star | 
CROSS SECTION
```

RIVER: Rio Grande

REACH: Lower Reach RS: 132.75

Description: Cross-Section data supplemented on the right by IBWC cross-section 132.75 from station 6897. 6897=7001-140 feet (the approximate difference at the relative bank stations). Bathymetric elevations

| | | | at the re
Erom IBWO | | | | Batnymeti | ric eleva | itions |
|--------------------|----------------|--------------------|------------------------|--------------------|----------------|--------------------|---------------|--------------------|----------------|
| Station H | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 81.53 | 6.56 | 83.26 | 19.68 | 85.33 | 42.65 | | 55.77 | 97.87 |
| 62.33 | 98.12 | 72.17 | 97.85 | 75.46 | 97.25 | 85.3 | 93.99 | 91.86 | 92.42 |
| 101.7
144.35 | 89.5
78.38 | 111.54
150.91 | 85.79 | 124.67
164.03 | 83.59
77.54 | 131.23
180.44 | 81.69
75.9 | 137.79
193.56 | 79.39
75.61 |
| 209.96 | 76.17 | 216.52 | 77.76
75.92 | 232.93 | 76.96 | 242.77 | 76.28 | 246.05 | 76.82 |
| 252.61 | 77.08 | 265.73 | 78.36 | 269.01 | 77.97 | 275.58 | 78.12 | 282.14 | 79.46 |
| 288.7 | 79.59 | 298.54 | 80.92 | 308.38 | 82.9 | 318.22 | 82.82 | 324.79 | 83.75 |
| 347.75 | 84.68 | 364.15 | 84.69 | 383.84 | 84.84 | 390.4 | | 416.65 | 84.55 |
| 436.33 | 84.35 | 456.01 | 84.38 | 478.98 | 84.33 | 511.78 | 84.17 | 515.07 | 84.3 |
| 531.47 | 83.95 | 554.43 | 83.88 | 580.68 | 83.62 | 587.24 | 83.8 | 597.08 | 83.6 |
| 623.33 | 84.04 | 649.57 | 83.85 | 656.13 | 84.14 | 675.82 | 84.18 | 698.78 | 83.9 |
| 711.91 | 84.16 | 738.15 | 84.12 | 757.83 | 83.99 | 764.4 | 84.12 | 784.08 | 84.17 |
| 807.05
934.99 | 83.94
84.03 | 836.57
964.52 | 84.1
83.85 | 856.25
984.2 | 83.84
83.89 | 885.78
990.76 | 84.13 | 892.34
1013.73 | 83.98
83.98 |
| 1023.57 | | 1033.41 | | 1046.53 | 83.72 | 1053.1 | | 1072.78 | 83.35 |
| 1085.9 | | 1099.02 | | 1128.55 | | 1131.83 | 84.19 | 1154.8 | 84.21 |
| 1171.2 | 84.36 | 1187.6 | | 1194.16 | | 1207.29 | | 1217.13 | 84.53 |
| 1226.97 | | 1240.09 | | 1246.66 | | 1259.78 | | 1263.06 | 82.56 |
| 1269.62 | | 1279.46 | | 1282.74 | 80.17 | 1289.3 | | 1295.87 | 85.32 |
| 1302.43 | | 1315.55 | | 1335.23 | 83.3 | 1341.8 | | 1351.64 | 81.72 |
| 1358.2 | | 1364.76 | | 1371.32 | | 1377.88 | | 1381.16 | 81.04 |
| 1391.01 | | 1400.85 | | 1404.13 | | 1427.09 | | 1430.37 | 78.2 |
| 1443.5 | | 1456.62 | | 1469.74 | | 1479.58 | | 1492.71 | 77.42 |
| 1502.55
1594.41 | | 1522.23
1617.37 | 77.33 | 1538.64
1646.9 | | 1548.48
1696.11 | | 1564.88
1709.23 | 77.4
77.2 |
| 1771.57 | | 1784.69 | | 1797.81 | 77.14 | 1833.9 | | 1843.74 | 77.54 |
| 1883.11 | | 1925.76 | | 1958.57 | 78.02 | 2004.5 | | 2017.62 | 78.17 |
| 2037.3 | | 2086.51 | | 2096.35 | | 2125.88 | | 2135.72 | 79.02 |
| 2142.28 | | 2161.97 | | 2171.81 | | 2175.09 | | 2181.65 | 80.75 |
| 2188.21 | | 2191.49 | | 2194.77 | 84.2 | 2207.9 | | 2224.3 | 84.11 |
| 2234.14 | | 2260.39 | 84.06 | 2270.23 | 84.16 | 2309.6 | | 2332.56 | 84 |
| 2355.52 | | 2358.81 | | 2378.49 | | 2385.05 | | 2394.89 | 83.7 |
| 2408.01 | | 2434.26 | | 2470.35 | | 2476.91 | | 2490.03 | 84.06 |
| 2506.43 | | 2539.24 | | 2549.08 | 84.1 | 2555.64 | 84.23 | 2581.89 | 84.23 |
| 2598.29 | 84.07 | | | 2637.66 | | 2650.78 | | | 84.14 |
| 2673.75 | | 2693.43 | | 2699.99 | | 2722.96 | | | 83.89 |
| 2778.73
2857.46 | 84.02
83.95 | 2798.41
2870.58 | | 2804.97
2880.43 | | 2831.22
2913.23 | | 2841.06
2919.79 | 83.82
83.78 |
| 2946.04 | | 2949.32 | | 2975.57 | | 2982.13 | | 3005.09 | 83.74 |
| 3011.65 | 83.84 | | | 3060.86 | 83.19 | 3070.7 | | 3077.27 | 83.25 |
| 3087.11 | 81.01 | 3093.67 | | 3113.35 | | 3123.19 | | 3146.16 | 81.93 |
| 3172.4 | 81.95 | 3192.09 | | 3215.05 | | 3247.86 | 82.13 | 3257.7 | 81.92 |
| 3267.54 | 82.04 | 3280.66 | 81.89 | 3287.23 | 81.6 | 3316.75 | 81.08 | 3339.72 | 80.95 |
| 3352.84 | 81.22 | 3369.24 | | 3382.36 | | 3405.33 | | 3425.01 | 81.27 |
| 3434.85 | 81.57 | | | 3484.06 | | 3493.91 | | 3500.47 | 82 |
| 3513.59 | | 3526.71 | | 3533.27 | | 3543.12 | | 3552.96 | 80.72 |
| 3562.8 | | 3572.64 | | 3592.33 | | 3605.45 | | 3618.57 | 80.27 |
| 3638.25
3684.18 | | 3641.54
3690.74 | | 3654.66
3697.31 | 80.26 | 3664.5
3703.87 | | 3677.62
3713.71 | 80.17
80.55 |
| 3723.55 | | 3746.52 | | 3762.92 | | 3769.48 | | 3799.01 | 80.55 |
| 3812.13 | | 3828.53 | | 3831.81 | | 3854.78 | 81.79 | 3867.9 | 81.73 |
| 3881.02 | | 3907.27 | | 3913.83 | | 3936.79 | 82.2 | 3953.2 | 81.98 |
| 3956.48 | | 3995.84 | | 4012.25 | | 4031.93 | | 4045.05 | 83.16 |
| 4061.46 | | 4081.14 | | 4090.98 | | 4113.95 | | 4127.07 | 81.03 |
| 4146.75 | 81.71 | 4173 | 81.47 | 4186.12 | 81.81 | 4215.65 | | 4228.77 | 82.48 |
| 4248.46 | | 4264.86 | 81.59 | 4277.98 | | 4287.83 | | 4297.67 | 81.78 |
| 4314.07 | | 4337.04 | | 4346.88 | | 4363.28 | | 4376.41 | 81.51 |
| 4386.25 | | 4392.81 | | 4405.93 | | 4419.06 | | 4425.62 | 80.69 |
| 4458.43 | | 4478.11 | | 4484.67 | | 4501.08 | | 4510.92 | 80.68 |
| 4524.04 | | 4556.85 | | 4563.41 | | 4583.09 | | 4589.66 | 80.69 |
| 4602.78
4720.89 | | 4625.74
4727.45 | | 4645.43
4743.85 | | 4691.36
4773.38 | | 4707.76
4783.22 | 83.26
83.05 |
| 4720.89 | | 4829.15 | | 4743.85 | | 4878.36 | | 4/83.22 | 83.05 |
| 4891.48 | | 4924.29 | | 4930.85 | 83.27 | 4953.82 | 83.19 | 4973.5 | 83.25 |
| 4999.75 | | 5006.31 | | 5019.43 | 82.99 | 5042.4 | | 5048.96 | 83.05 |
| 5071.92 | | 5081.77 | | 5094.89 | | 5108.01 | | 5134.26 | 83.02 |
| 5170.35 | 82.82 | 5180.19 | 82.98 | 5209.72 | 82.83 | | | 5232.68 | 82.92 |
| 5242.52 | 83.04 | 5252.37 | 82.89 | 5265.49 | 83.17 | 5275.33 | | 5285.17 | 83.15 |
| 5301.58 | 83 | 5311.42 | 83.13 | 5324.54 | 83.01 | 5334.38 | 83.15 | 5344.23 | 83 |
| 5367.19 | | 5373.75 | | 5406.56 | 82.99 | 5416.4 | | 5426.25 | 82.88 |
| 5445.93 | | 5459.05 | | 5468.89 | 82.89 | 5485.3 | | 5495.14 | 82.84 |
| 5514.83 | 82.86 | 5524.67 | 82.99 | 5534.51 | 82.81 | 5547.63 | 83.05 | 5554.19 | 82.84 |

```
82.96 5600.06
82.9 5668.84
82.76 5744.17
                                82.96 5573.86
82.77 5642.64
                                                                                                                                                                                82.79 5606.61
   5619.71
5691.76
                                                                                82.76 5665.56
82.74 5717.97
                                                                                                                                                                               82.71 5681.94
82.9 5780.19
                                                                                                                                                                                                                               82.68
82.73
                                82.91 5812.94
82.84 5934.12
                                                                                                                               82.89 5842.42
82.78 5953.77
                                                                                                                                                                               82.88 5871.89
   5786.74
                                                                                82.75 5826.04
                                                                                                                                                                                                                                82.66
   5888.27
                                                                                 82.68 5943.95
                                                                                                                                                                                82.65
   5979.97
                                 82.67 6012.72
                                                                                   82.6 6048.75
                                                                                                                               82.76 6058.57
                                                                                                                                                                                82.54
                                                                                                                                                                                                    6068.4
                                                                                                                                                                                                                                82.73
      6081.5
6199.4
                                82.59 6107.7
82.4 6205.95
                                                                                82.66 6120.8
82.56 6215.78
                                                                                                                               82.55 6160.1
82.34 6228.88
                                                                                                                                                                               82.47
82.46
                                                                                                                                                                                                    6238.7
   6268.18
                                 82.3 6278.01
81.55 6363.16
                                                                                82.17 6310.76
81.24 6379.53
                                                                                                                               82.19 6317.31
81.51 6386.08
                                                                                                                                                                                81.97 6330.41
81.96 6392.63
   6402.46
                                 79.06 6418.83
                                                                                79.53 6428.66
                                                                                                                                79.67 6438.48
                                                                                                                                                                                79.31 6461.41
                                                                                                                                                                                                                                79.42
                                79.83 6484.34
80.69 6562.94
                                                                                80 6500.71
80.72 6576.04
                                                                                                                               79.97 6526.91
81.31 6585.86
                                                                                                                                                                               80.39 6533.46
82 6598.96
   6553.11
                                                                                                                                                                                67.06 6641.54
                                                                                74.47 6628.44
62.96 6652.09
    6608.79
                                77.33 6618.61
                                                                                                                                70.49 6634.99
                                                                                                                                                                                                                                64 01
   6644.81
                                                                                                                                                                                57.53 6672.09
                                 63.14 6648.09
                                                                                                                                61.73 6662.09
                                                                                                                                                                                                                                56.23
   6692.09
                                55.23 6702.09
55.83 6772.09
                                                                                55.73 6722.09
                                                                                                                               55.93 6742.09
                                                                                                                                                                                56.73 6752.09
                                                                                                                                                                                56.53 6792.19
                               63.1 6798.74
78.39 6841.32
                                                                                64.81 6805.29
80.42 6854.42
                                                                                                                               70.23 6811.84
83.61 6860.97
   6795.47
                                                                                                                                                                                73.21 6824.94
                                                                                                                                                                                                                                76.47
           7123
                              82.42
                                                          7139
                                                                                84.24
                                                                                                        8538
                                                                                                                               81.04
                                                                                                                                                          8674
                                                                                                                                                                                82.04
                                                                                                                                                                                                           8684
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .118 6500.71 .066 6634.99
                                                                                                                            n Val Sta
.015 6798.74
                                                                                                                                                                              n Val
.066
                                                                                                                                                                                                                              n Val
.067

        Bank Sta: Left
        Right
        Lengths: Left Channel
        Right

        6585.86
        6860.97
        755.05
        1535
        1364.62

        Left Levee
        Station=
        62.33
        Elevation=
        98.12

        Right Levee
        Station=
        8684
        Elevation=
        91.84

                                                                                                                                                                                  Coeff Contr.
                                                                                                                                                                                                                                Expan.
| Sta L | Sta R | Elev | Sta L | Sta R | Sta R | Elev | Sta L | Sta R | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta 
CROSS SECTION OUTPUT Profile #Design Flow
      E.G. Elev (ft)
                                                                                     93.32
                                                                                                                                                                                            Left OB
                                                                                                                                                                                                                                                             Right OB
                                                                                                                                                                                                                              Channel
                                                                                                                Element
                                                                                                                Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
      Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                      0.15
93.17
                                                                                                                                                                                            0.116
755.05
                                                                                                                                                                                                                            0.040
1535.00
                                                                                                                                                                                                                                                                   0.067
                                                                                      86.81
                                                                                                                                                                                         64076.10
                                                                                                                                                                                                                             7672.54
                                                                                                                                                                                                                                                          16608.18
                                                                                                                Area (sq ft)
      E.G. Slope (ft/ft)
      Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                                                                                                            59577.11
6497.14
                                                                            125000.00
                                                                                                                    Flow (cfs)
                                                                                                                                                                                                                             40041.62
                                                                                                                                                                                                                                                             25381.28
                                                                                                               Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                                                                                                                                                   5.22
                                                                                        1.41
                                                                                                                                                                                                    0.93
                                                                                                                                                                                                                                                                      1.53
     Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                                                                                               Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                      37 94
                                                                                                                                                                                                    9 86
                                                                                                                                                                                                                                  27 89
                                                                                                                                                                                                                                                                      9 11
                                                                             7907594.0
                                                                                                                                                                                            3768892.0
                                                                                                                                                                                                                           2533063.0
                                                                                                                                                                                                                             290.45
```

Shear (lb/sq ft) Stream Power (lb/ft s) Cum Volume (acre-ft)

Cum SA (acres)

1160.91 55.23

4.80

0.01

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

6499.97

6551.63

0.14

1827.68

5204.45

0.22

2.15

901.11

CROSS SECTION

RIVER: Rio Grande

Alpha Frctn Loss (ft)

C & E Loss (ft)

REACH: Lower Reach RS: 132.46*

Description:

| Descriper | | | | | | | | | |
|-----------|----------|-------------------------------|-------|---------|-------|---------|-------|---------|-------|
| Station E | levation | n Data | num= | | | | | | |
| Sta | Elev | | Elev | | Elev | Sta | Elev | Sta | Elev |
| 0 | 83.65 | 1.56 | 85.04 | 12.19 | 86.78 | 30.8 | 92.44 | 41.43 | 96.71 |
| 46.75 | 96.99 | 54.87 | 96.57 | 57.58 | 96.04 | 65.7 | 93.36 | 71.12 | 91.97 |
| 79.24 | 89.46 | | 86.36 | 98.2 | 84.34 | 109.03 | 80.85 | 119.85 | 79.29 |
| 130.68 | 78.87 | | 77.37 | | 77.05 | | 77.41 | | |
| 187.55 | 78.02 | | 77.52 | | 79.08 | | 78.78 | | |
| 228.16 | 79.96 | | | | 80.98 | | 82.41 | | |
| 263.36 | 83.15 | | 83.87 | | 83.98 | | 83.81 | | |
| 355.41 | 83.62 | | 83.58 | | 83.48 | 420.4 | 83.58 | | 83.32 |
| 452.88 | 83.27 | | 83.06 | | 83.04 | | | 531.4 | |
| 536.82 | 83.46 | | | | 83.3 | | | 620.75 | |
| 642.42 | | 661.37 | | 685.74 | 83.43 | | | 726.35 | |
| | | | | | | | | | |
| 731.76 | 83.37 | | 83.4 | | 83.25 | | 83.29 | | |
| 831.95 | 83.36 | 840.07 | 83.19 | 848.19 | 83.36 | 859.02 | 83.1/ | 864.44 | |
| 880.68 | 82.89 | 891.51
975.45 | 82.89 | 902.34 | 83.26 | 926.71 | 83.59 | 948.38 | |
| 961.91 | | | | 980.86 | 83.5 | 991.7 | 83.02 | 999.82 | |
| 1007.94 | | 1024.19 | | | 82.35 | 1043.14 | 80.8 | 1051.26 | 80.11 |
| 1053.97 | | 1059.38 | | | | | | 1081.04 | |
| 1097.29 | 82.88 | 1102.71
1143.32 | 81.9 | 1116.24 | 81.35 | 1121.66 | | 1132.49 | 80.75 |
| 1135.19 | 81.19 | 1143.32 | 81.64 | 1154.15 | 79.72 | 1173.1 | | 1175.81 | |
| 1186.64 | 78.62 | 1197.47
1273.28 | 78.39 | 1208.3 | 78.88 | | | 1251.62 | |
| 1265.16 | 78.97 | 1273.28 | 78.88 | 1286.82 | 78.46 | 1311.19 | 78.29 | 1330.14 | |
| 1354.51 | 78.28 | 1395.12 | 78.39 | 1405.95 | 78.31 | 1457.4 | 78.39 | 1468.23 | |
| 1479.06 | 78.4 | 1395.12
1508.84
1649.64 | 78.66 | 1516.97 | 78.6 | 1549.46 | 78.79 | 1584.66 | 78.76 |
| 1611.74 | 78.97 | 1649.64 | 78.94 | 1660.47 | 79.1 | 1676.71 | 79.04 | 1717.33 | |
| 1725.45 | 79.48 | 1749.82 | 79.31 | 1763.35 | 80.23 | 1779.6 | 80.23 | 1787.73 | |
| 1790.43 | | 1795.85 | | | | | 83.71 | 1817.51 | 83.86 |
| 1831.05 | 83.54 | 1839.17
1958.3 | 83.63 | 1860.83 | 83.51 | 1868.95 | | 1901.44 | |
| 1920.39 | 83.46 | 1958.3 | 83.32 | 1963.71 | 83.11 | 1971.84 | 83.26 | 1982.66 | 83.14 |
| 2004.33 | 83.64 | 2034.11 | 83.56 | 2039.53 | 83.72 | 2063.89 | 83.45 | 2090.97 | 83.7 |
| 2126.17 | 83.65 | 2139.7 | 83.53 | 2161.37 | 83.54 | 2183.02 | 83.71 | 2191.15 | 83.6 |
| 2201.98 | 83.82 | 2218.22 | 83.66 | 2242.6 | 83.7 | 2275.08 | 83.42 | 2288.62 | 83.51 |
| 2340.06 | 83.36 | 2218.22
2353.6 | 83.48 | 2399.63 | 83.45 | 2405.04 | 83.36 | 2426.71 | 83.39 |
| 2451.08 | | 2480.85 | | | | | 82.93 | 2529.59 | 83.22 |
| 2535.01 | | 2543.13 | | | | | | 2591.87 | |
| 2613.52 | | 2629.77 | | | | 2675.8 | | 2683.92 | |
| 2702.87 | 81.99 | 2708.29 | 81.77 | 2732.66 | 81.37 | 2751.61 | | 2762.44 | |
| 2775.98 | | 2786.81 | | | | 2822.01 | | 2843.67 | |
| 2870.74 | | 2878.87 | | 2905.94 | | 2911.35 | | 2919.48 | |
| 2935.72 | | 2943.85 | | | | 2981.75 | | 2997.99 | |
| 3011.54 | | 3019.66 | | | | 3041.31 | | 3046.74 | |
| 3052.15 | | 3060.27 | | | | 3100.89 | | 3106.3 | |
| 3130.67 | | | | 3155.03 | | 3157.74 | | 3176.7 | |
| 3187.53 | | | | 3220.02 | | 3225.43 | | 3260.63 | |
| 3293.12 | | | | 3322.9 | | | | 3347.27 | |
| 3363.52 | | 3371.64 | | | | | | 3417.67 | |
| 3439.33 | | | | 3485.36 | | | | 3515.14 | 81.79 |
| 2122.23 | 01.07 | 3130.10 | 01.74 | 5105.30 | 02.4 | 2201.01 | 01.91 | 2212.14 | 01.79 |
| | | | | | | | | | |

| 3691.14 81.25 3766.1: 3794.03 82.51 3812.9; 3910.46 82.96 3934.8: 4059.38 82.95 4064.7; 4162.27 82.89 4181.2; 4232.67 82.88 4262.4; 4330.15 82.82 4340.9; 4473.65 82.82 4424.9; 4473.65 82.82 4424.9; 4473.65 82.82 4489.8; 4530.51 82.81 4554.8; 4603.78 82.89 4617.: 4684.67 82.68 4736.0; 4817.12 82.87 4841.4; 4957.67 82.64 4987.4; 5036.06 82.67 5046.8; 5168.51 82.43 5176.6; 5260.4 81.87 5265.8; 5309.06 80.19 5327.9; 5387.44 80.95 5411.7; 5454.22 77.39 5464.; 5539.69 54.6 5549.8; 5539.69 54.6 5549.8; 5539.69 54.6 5549.8; 5539.69 54.6 5599.8; 5605.26 56.22 5606.9; 5537.11 60.5 5648.3; 5714.48 82.3 5721.4; 5787.36 82.02 5796.7; 5922.94 81.72 6022.6; 6165.96 83.07 6229.99 6314.75 83.89 6361.8; 6550.19 83.45 6559.0; 6823.3 82.99 6842.1; 6983.4 82.51 7049.3; 7200.01 82.99 7228.2; 7482.54 82.7 7491.3; 7708.56 82.2 7727.4 7793.32 81.96 7802.7 7793.32 81.96 7802.7 7793.32 81.96 7802.7 7793.32 80.82 7878.06 7934.59 80.88 7953.4; 8094.69 80.32 8104.1 81.99 8320.73 8386.64 80.59 8396.0; | 2 82.91 4189.35 82.75 4200.18 3 82.73 4270.57 82.86 4294.95 4 83.01 4349.09 82.88 4357.22 5 82.85 4430.32 82.99 4457.4 8 82.92 4563 82.78 4573.83 8 82.92 4563 82.89 4652.24 8 82.85 4765.76 82.73 4771.17 8 82.76 4995.51 82.6 5003.62 8 82.35 5079.31 82.54 5100.93 8 82.35 5203.65 82.35 5241.49 8 82.35 5242.59 80.6 5360.41 8 82.35 5242.59 81.88 5430.69 8 82.35 5242.59 81.88 5430.69 8 82.25 5565.21 556.11 5569.21 557.5482.5 8 66.29 5498.65 60.69 5508.91 75.96 | 80.91 3783.2 83.01 3896.92 83.06 4021.47 82.91 4156.85 82.91 4211 82.75 4305.77 83.4370.76 82.89 4465.52 82.87 4522.39 82.96 4579.24 82.74 4671.16 82.87 4792.79 82.69 4917.13 82.74 5014.44 82.66 5125.26 81.88 5246.89 80.03 5300.95 80.69 5382.04 82.51 5444.13 65.79 5485.55 6.67 5519.17 55.6 5595.26 59.97 5629.27 65.25 5655.39 78.12 5700.58 81.97 5768.52 82.01 5872.12 81.75 6140.38 83.03 6267.66 83.66 6521.94 83.35 6795.05 82.56 6936.31 82.57 7143.5 82.54 7463.7 80.24 7623.8 82.43 7699.15 81.56 7783.9 80.67 7840.41 80.53 7925.17 80.42 8000.51 80.53 7925.17 80.42 8000.51 80.53 8443.14 81.59 8518.48 82.38 8612.66 88.24 8648.71 89.87 8708.71 | 83.18
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| Sta n Val Sta | num= 5
a n Val Sta n Val Sta
9 .066 5476.41 .015 5626.47 | n Val Sta
.066 5721.43 | n Val
.067 |
| Bank Sta: Left Right 5430.69 5721.43 Left Levee Station: Right Levee Station: Blocked Obstructions Sta L Sta R Elev | Lengths: Left Channel Right 755.05 1535 1364.62 = 46.75 Elevation= 96.99 :8636.205 Elevation= 92.0475 num= 2 7 Sta L Sta R Elev 9 7475.62 8691.91 82.68 | | |
| CROSS SECTION | | | |
| RIVER: Rio Grande
REACH: Lower Reach | RS: 132.18* | | |
| INPUT Description: Station Elevation 0 86.82 18.9(56.78 89.43 63.1(97.33 80.19 108.0) 142.16 79.08 148.5(178.45 80.47 184.8(216.87 83.06 240.3) 323.59 82.79 379.0(430.32 82.8 445.2(550.94 82.73 605.7(662.97 82.75 675.7(724.87 82.89 752.6(797.44 82.86 810.2(82.94 82.65 833.7(863.62 81.81 874.2(904.17 80.35 919.1(953.26 79.54 981.0(1042.91 79.51 1062.1(1151.77 79.64 1160.3(1264.9 79.92 1316.1(1264.9 79.92 1316.1(1264.9 79.92 1316.1(1264.9 79.92 1316.1(1264.9 79.92 1316.1(1264.9 79.92 1316.1(1264.9 82.87 80.77 1397.2(1416.44 83.12 1427.1(1508.23 82.93 1538.1(1602.14 83.09 1621.3(1743.02 83.08 1762.2(1849.74 83 1907.3(1982.08 82.66 1988.4(2022.63 81.98 2037.5(2103.74 82.17 2110.14 2172.04 81.74 2182.7(2257.42 82.41 2263.8(2327.86 81.22 2344.9(2327.86 81.22 2344.9(2327.86 81.22 2344.9(2327.86 81.22 2344.9(2327.86 81.22 2344.9(2327.86 81.22 2344.9(23396.16 82.21 2400.4(2462.33 81.48 2470.8(2518.26 82.27 2532.7(2613.88 82.65 2633.0(2688.58 81.98 2705.66 | 5 92.45 27.1 95.55 31.17 8 86.94 71.72 85.09 80.26 1 78.84 116.55 78.49 127.22 5 78.75 163.5 79.8 169.91 5 81.03 191.25 81.92 197.65 5 82.12 244.61 83 261.69 8 82.84 396.16 82.71 413.24 8 82.76 547.71 82.64 566.92 8 82.77 630.95 82.68 635.22 8 82.71 688.59 82.43 667.22 8 82.292 767.56 82.84 776.1 8 82.35 816.65 81.11 823.06 8 81.48 878.56 81.62 887.09 8 81.48 878.56 81.62 887.09 8 80.81 1929.79 79.61 991.69 79.87 1008.76 79.4 | Elev Sta 95.87 39.71 82.3 88.8 78.64 131.48 79.75 174.18 81.96 201.93 82.98 293.34 82.62 417.5 82.69 500.75 82.82 583.85 82.81 656.57 82.41 705.66 82.54 782.5 80.64 825.19 83.27 859.34 81.05 895.63 79.46 946.86 79.52 1027.97 79.43 1143.23 79.78 1243.55 80.25 1373.76 81.36 1414.31 83.01 1414.31 83.01 1414.31 83.01 1493.29 83.02 1597.88 82.99 1730.21 83.01 1839.07 82.98 1965 81.57 2003.42 81.93 2082.4 81.66 2163.51 81.76 2236.08 81.88 2308.65 81.29 2283.35 81.32 2443.12 81.76 2498.62 82.14 2589.1 81.75 2675.78 82.33 2754.76 | 81. 82
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| 2765.43 | 81.99 | 2780.37 | | 2786.77 | | 2797.44 | 82.32 2812.39 | 81.89 |
| 2829.46
2904.17 | 81.99
81.64 | | | 2848.67
2972.47 | | 2870.02
2976.75 | 81.55 2891.37
81.56 2985.28 | 81.55
82.48 |
| 3013.03
3141.1 | | 3042.92
3164.58 | | 3053.59
3194.47 | | 3102.68
3198.73 | 82.71 3132.56
82.9 3226.48 | 82.77
82.93 |
| 3243.56
3360.96 | 82.76 | 3271.31
3380.17 | 82.65 | 3305.46
3388.71 | 82.79 | 3331.08
3407.92 | 82.74 3354.56
82.75 3416.46 | 82.65
82.85 |
| 3439.94 | 82.8 | 3461.28 | 82.9 | 3474.82 | 82.78 | 3486.89 | 82.89 3521.05 | 82.75 |
| 3531.52
3638.4 | 82.84 | 3542.39
3661.84 | 82.72 | 3565.87
3676.75 | 82.79 | 3600.02
3678.89 | 82.87 3634.14
82.69 3710.85 | 82.75
82.72 |
| 3727.9
3811 | 82.8
82.74 | 3751.33
3836.2 | 82.73
82.82 | 3755.59
3864.27 | | 3772.64
3870.66 | 82.79 3781.16
82.8 3902.62 | |
| 3938.85
4068.83 | 82.76 | 3947.37
4075.23 | 82.68 | 3998.51
4096.53 | 82.61 | 4028.34 | 82.75 4034.74
82.21 4130.63 | 82.63 |
| 4141.28 | 82.23 | 4145.54 | 82 46 | /1// Q | 81.59 | 4156.2 | 81 4173.24 | 81.27 |
| 4179.63
4241.43 | 81.64 | 4194.55
4260.61 | 81.16 | 4268.44 | 82.39 | 4275.52 | 81.41 4237.17
83.02 4281.77 | 82.29 |
| 4289.3
4331.78 | 81.1
63.71 | 4300.52
4341 | 77.19
61.22 | | | 4355.73 | 69.69 4328.65
55.81 4366.25 | 65.16
54.77 |
| 4387.3
4435.57 | | 4392.3
4448.43 | 53.97 | 4400.41
4457.21 | | 4408.53
4459.01 | 54.54 4416.64
56.28 4460.77 | 54.37
59.16 |
| 4469.63
4504.57 | 59.53 | 4472.59
4504.68 | 60.03 | 4481.45
4508.36 | 63.74 | 4484.41
4512.03 | 64.41 4493.27
68.31 4516.9 | 63.88 |
| 4519.39 | 71.21 | 4526.74 | 72.85 | 4531.67 | 73.62 | 4540.53 | 75.85 4548.81 | 77.66 |
| 4559.83
4607.79 | 80.18 | 4567.12
4620.73 | 80.05 | 4574.54
4633.68 | | 4581.9
4646.62 | 81.14 4594.84
80.12 4659.57 | 80.31 |
| 4672.51
4789.02 | | 4685.46
4814.91 | 81.25 | 4827.85 | | | 81.04 4763.13
81.19 4892.58 | |
| 4944.36
5157.76 | | 4970.25
5192.93 | 81.14 | 4996.14
5229 15 | | | 81.05 5138.54
81.78 5280.93 | |
| 5293.88
5462.16 | 81.92 | 5319.77
5513.94 | 81.96 | 5332.71
5552.78
5746.96 | 83.77 | 5397.44
5630.45 | 83.75 5449.22
83.3 5656.34 | 83.66
83.31 |
| 5682.23 | 83.21 | 5721.07 | 83.21 | 5746.96 | 83.06 | 5785.79 | 83.16 5876.41 | 83.22 |
| 5928.19
6057.64 | | 5967.02
6083.53 | 82.69 | 6096.47 | 83.2 | 6122.36 | 83.09 6005.86
82.26 6148.25 | 83.14
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| 6225.93
6407.16 | | 6251.82
6484.83 | 82.08 | 6497.77 | | 6316.54
6510.72 | 81.94 6368.32
82.56 6523.66 | |
| 6536.61
6691.95 | | 6601.33
6717.84 | 83.23 | 6614.28
6756.68 | 83.23 | 6653.11
6834.35 | 82.91 6679 | 82.91 |
| 6976.74 | 82.82 | 6989.69 | 83.05 | 7002.63
7145.03 | 83.05 | 7015.58 | 82.62 6912.02
79.19 7041.47
78.23 7196.81 | 78.16 |
| 7067.36
7209.75 | 78.37 | 7106.19
7235.64 | 78.42 | 7248.59 | 79.58 | 7157.97
7261.54 | 79.57 7274.48 | 82.78 |
| 7287.43
7365.1 | | 7300.37
7390.99 | | 7313.32
7416.88 | | 7339.21
7429.82 | 82.36 7352.15
82 7442.77 | 81.32
80.47 |
| 7455.71
7533.38 | | 7468.66
7546.33 | | 7481.6
7559.27 | | 7494.55
7572.22 | 79.93 7520.44
79.29 7585.16 | 79.82
79.28 |
| 7598.11 | 79.42 | 7611.05 | 79.41 | | 80.06 | 7636.94 | 80.28 7649.89 | 80.28 |
| 7662.83
7727.56 | 80.01 | 7675.78
7753.45 | 82.04 | 7766.39 | 82.17 | 7701.67 | 79.46 7714.61
82.16 7792.29 | 79.73 |
| 7805.23
7895.85 | | 7818.17
7934.68 | 79.77 | 7844.07
7960.57 | | 7857.01
7973.52 | 79.95 7882.9
80.3 7986.46 | 80.49 |
| 8012.35
8090.02 | 80.54
82.78 | 8025.3
8102.97 | | 8038.24
8128.86 | 81.28
83.11 | 8051.19
8141.8 | 81.67 8077.08
83.1 8154.75 | 81.59
83.47 |
| 8180.64
8258.31 | | 8193.58 | 79.68 | 8206.53
8297.14 | 80.16 | 8219.47
8310.09 | 80.04 8245.36
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| 8335.98 | 81.39 | 8348.92 | 82.17 | 8361.87 | 82.19 | 8374.82 | 81.67 8387.76 | 81.74 |
| 8413.65
8504.27 | | 8556.05 | 84.65 | 8439.54
8566.43 | 85.77 | 8576.11 | 82.62 8491.32
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92.25 |
| 8602.41
8713.41 | | 8613.41
8733.41 | 83.74
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8753.41 | | 8653.41
8813.41 | 91.69 8673.41
87.35 8833.41 | 89.3
87.38 |
| 8873.41 | 87.33 | 8913.41 | 87.16 | 9013.41 | 87.01 | 9033.41 | 86.85 9093.41 | 86.9 |
| Manning's
Sta | n Valu | es
Sta | | 5
Sta | n Val | Sta | n Val Sta | n Val |
| 0 | .118 | 4275.52 | .07 | 4331.78 | | 4516.9 | | |
| Bank Sta: | Left | Right | Lengths | s: Left Ch | nannel | Right | Coeff Contr. | Expan. |
| 42
Ineffecti
Sta L | ve Flow | 4581.9
num: | = : | 755.05
2 | 1535 | 1364.62 | .1 | . 3 |
| 0 - | 4275.52 | 83.02 | Permane
T | ent | | | | |
| 4581.9
Left Leve | | 81.14 | T | | zation= | 95.87 | | |
| Right Leve | | | | | ration=
ration= | 92.255 | | |
| Blocked O | Sta R | Elev | Sta L | Sta R | Elev | | | |
| | | 82.5 | 7010.9 | 8548.48 | 83.15 | | | |
| CROSS SEC | TION | | | | | | | |
| RIVER: Ri | o Grand | e | | | | | | |
| REACH: Lo | | | RS: 131 | 1.89* | | | | |
| INPUT | on: | | | | | | | |
| Description E | levatio: | n Data | num= | 490 | _, | | | |
| Sta
0 | 89.69 | | Elev
92.46 | 12.76 | Elev
94.39 | 15.58 | Elev Sta
94.74 21.83 | Elev
93.62 |
| 29.64
71.8 | 91.08 | 39
78.04 | 87.51
79.92 | | 85.84
79.83 | 51.5 | 83.76 57.74
80.13 101.46 | 82.35
79.99 |
| 112.39 | 80.51 | 117.08
140.5 | 80.57 | 120.2 | | 123.32 | 80.9 132.69
82.25 176.26 | |
| 191.82 | 82.19 | 207.37 | 82.06 | 228.09 | 82.1 | 270.09 | 81.93 282.58 | 82.05 |
| 324.74
425.06 | 82.15 | 346.59
435.42
502.8 | 82.03
82.16 | 444.97 | 82.06 | 457.45 | 82.04 419.88
82.14 473.07 | 82.24
82.07 |
| 487.12
565.19 | 82.12
82.32 | 502.8
579.25 | 81.92
82.21 | | 82.19
81.92 | | 82.19 560.51
81.41 594.86 | |
| 602.67 | | 605.79 | 82.32 | | 82.43 | 621.4 | 82.04 624.53
80.97 665.12 | 81.72 |
| 679.17
730.7 | 80.53 | 685.42
744.75 | 80.69 | 690.1 | 80.56
80.62 | 710.4 | 80.61 718.21 | 80.77
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| 863.42 | 80.72 | 870.82 | | | | 918.07 | 80.54 829.07
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81.31 1014.87 | 80.95 |
| 974.48
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| 1096.06
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| 1338.07 | 82.43 | 1345.88 | 82.53 | 1388.04 | 82.56 | 1399.5 | 82.46 1420.23 | 82.56
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| 1495.77 | 82.14 | 1503.17 | 82.06 | 1516.07 | 82.24 | 1536.37 | 82.12 1547.29
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55.7 3312.76
                                                                  53.92 3268.08
56.33 3314.61
                                                                                           53.64 3278.53
60.68 3317.73
  3242.41
  3288.04
                                                                  67.5 3339.54
69.42 3364.81
72.78 3389.39
79.27 3434.6
78.23 3508.25
                                         62.1 3336.42
67.81 3360.92
72.27 3386.27
77.86 3426.77
 3323.96
3348.96
                 61.36 3327.08
67.7 3360.8
                                                                                           68.5 3342.65
69.54 3368.68
                 71.69 3380.05
76.93 3414.31
                                                                                           73.28 3398.74
79.67 3442.36
  3376.43
                                                                                                                    75.64
                                                                                           78.44 3524.72
79.71 3607.08
80.68 3738.86
  3458.83
                 79.73
                           3475.3
                                          78.38 3491.78
                                                                                                                    78.42
 3541.19
3623.56
                 78.73 3557.67
                                         79.31 3574.14
80.07 3672.97
                                                                  79.29 3590.61
80.47 3705.92
                 79.94 3640.03
                                                                                                                    80.62
                                                                   80.7 3903.59
80.4 4134.21
  3755 34
                 80.74 3821.23
                                         80.65 3837.7
                                                                                           80.63 3936.53
                                                                                                                    80 56
                                         80.42 4035.37
                                                                                           80.41 4150.68
  3969.48
                 80.59
                           4018.9
                 80.33 4219.89
                                                                                           80.54 4298.93
80.89 4381.29
83.51 4562.49
                                         80.72 4233.04
80.45 4348.35
                                                                  80.72 4265.99
80.82 4364.82
 4175.15
                                                                                                                    80.59
                                         83.63 4480.13
83.44 4677.8
83.06 4809.58
                 83.61 4430.71
                                                                  83.62 4546.02
 4397.77
                                                                                                                     83.4
 4595.44
4760.16
                 83.45 4628.38
83.12 4776.63
                                                                  83.25 4710.74
83.08 4842.53
                                                                                           83.22 4727.22
82.95 4875.47
                                                                                                                    82.92
                 82.96 4924.89
                                         82.76 4957.83
83.07 5155.5
                                                                  82.83 4974.31
83.1 5171.98
                                                                                           82.92 5040.2
83.05 5204.92
 4891 94
                                                                                                                    83 01
                   83.1 5089.61
                                         82.94 5254.34
 5221.39
                 83.09 5237.87
                                                                  83.01 5287.28
                                                                                           82.95 5320.23
                                                                                                                    82.85
                                         82.37 5386.12
81.35 5567.32
81.38 5682.63
                 82.37 5369.65
                                                                  81.51 5583.79
81.49 5699.1
81.65 5863.82
                 81.35 5534.37
81.38 5649.68
                                                                                           81.46 5616.74
81.49 5715.57
81.67 5880.3
   5517.9
                                                                                                                    81.48
 5633.21
5764.99
                 81.69 5814.41
                                         81.68 5830.88
                                                                                                                    81.89
                                                                                            83.2 5962.66
                 82.4 5913.24
83.46 6028.55
                                         82.72 5929.71
83.46 6061.49
                                                                  83.21 5946.19
83.13 6077.97
                                                                                                                      83.3
 5896.77
                                                                                           83.01 6110.91
                                         82.88 6209.75
                                                                                           82.71 6292.11
82.74 6407.42
 6127.38
                 82.92 6193.27
                                                                    82.8 6275.64
                                                                                                                    82.64
                 82.66 6325.06
                                                                   82.67 6374.47
                                                                                           83.4 6522.73
76.09 6621.56
76.24 6769.81
 6423.89
                 82.87 6440.36
                                         82.87 6489.78
                                                                  83.03 6506.25
                                                                                                                    83.39
                 77.61 6555.67
76.23 6670.98
                                                                   76.08 6605.09
 6654.51
                                          76.18 6703.92
                                                                            6720.4
                                                                   76.17
                                                                                                                    76.21
                                         76.47 6819.23
83.27 6901.6
80.71 7016.9
                                                                  76.57 6835.71
83.19 6918.07
 6786.29
6868.65
                 76.48 6802.76
83.13 6885.12
                                                                                           78.31 6852.18
82.55 6951.01
                                         80.71 7016.9
79.75 7099.27
                                                                  80.78 7033.38
79.75 7115.74
78.83 7198.1
                                                                                           80.65 7049.85
79.13 7132.21
 6967 49
                 80 99 6983 96
                                                                                                                     80 7
                 82.05 7082.79
78.98 7165.16
                                         78.83 7181.63
                                                                                           79.09 7214.57
                                                                                                                    79.04
 7148.68
                 79.67 7247.52
79.23 7329.88
                                         78.05 7263.99
79.58 7346.35
                                                                  78.05 7280.46
79.57 7362.83
                                                                                           78.26 7296.94
78.66 7379.3
  7313.41
                                                                                                                    78.51
                                         78.38 7428.72
82.48 7511.08
78 7593.44
78.82 7675.81
79.78 7774.64
  7395.77
                 77.99 7412.24
82.28 7494.61
                                                                  78.38 7445.19
82.47 7527.55
                                                                                           79.21 7461.66
78.82 7544.02
                                                                                                                    78.65
 7478.13
                 78.18 7576.97
79.07 7659.33
                                                                  78 7609.92
78.82 7692.28
80.07 7807.59
                                                                                           79.2 7626.39
78.96 7708.75
   7560 5
 7642.86
                 79.78 7758.17
                                                                                           80.16 7824.06
                                                                                                                    81.29
                                         81.88 7873.48
84.07 7972.31
                                                                  81.9 7889.95
84.07 7988.78
                                                                                           81.77 7906.42
84.62 8005.26
                 83.56 7955.84
 7922.89
                                                                                                                    84.62
 8021.73
8104.09
                 84.52 8038.2
79.64 8120.56
                                                                  79.69 8071.15
79.63 8153.51
                                                                                           79.52 8087.62
80.03 8169.98
                                          78.96 8054.67
                                          79.08 8137.04
                                                                                                                    80.04
                                         79.89 8219.4
81.89 8318.24
 8186.45
                 79.52 8202.93
                                                                   81.46 8235.87
                                                                                           82.59 8252.34
                                                                                                                      82 6
                  81.8 8285.29
                                                                   81.32 8334.71
                                                                                           81.33 8351.18
 8268.82
 8367.65
                   83.1 8384.13
                                         83.04 8417.07
                                                                  83.03 8433.54
                                                                                           83.47 8499.43
                                                                                                                    85.97
                 87.64 8524.97
81.05 8578.12
                                         90.41 8532.38
79.69 8608.12
                                                                   91.25 8540.62
                                                                                           92.46 8550.37
 8561.62
                                                                  85.22 8638.12
                                                                                           91.62 8668.12
                                                                                                                    88.03
                 85.94 8758.12
85.15 8938.12
                                         85.3 8788.12
85.05 8968.12
 8728.12
                                                                   85.37 8818.12
                                                                                           85.25 8878.12
                                                                                                                      85.1
                                                                  85.07 9028.12
 8908.12
                                                                                           84.83 9058.12
                                                                                                                    84.83
 9088.12
                 84.75 9178.12
                                           84.6 9208.12
                                                                  84.35 9268.12
                                                                                           84.45 9298.12
Manning's n Values
                                        nıım=
                                          n Val Sta
                                                                                          n Val Sta
.07 3442.36
      Sta n Val Sta n Val
0 .066 3120.35 .07
                                                                n Val Sta
.025 3336.42
                                        Lengths: Left Channel Right
Bank Sta: Left Right
                                                                                            Coeff Contr.
                                                                                                                    Expan.
                                        755.05
          3120.35 3442.36
                                                                 1535 1364.62
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
    Sta L Sta R
0 3120.35
                             83.53
79.74
 3442.36 9298.12
                     Station= 15.58
Station=8540.615
Left Levee
Right Levee
                                                          Elevation= 94.74
Elevation=92.46249
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RIVER: Rio Grande

RS: 131.6

Description: Cross-Section data supplemented on the right by IBWC cross-section 131.6 from right bank station. 2302.82=3380-1077.18 feet (the approximate difference at the relative bank stations). Bathymetric elevations translated from IBWC 2008 Cross-sections

| Station E | levation | Data | num= | 459 | | | | | |
|-----------|----------|--------|-------|--------|-------|--------|-------|--------|-------|
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 93.61 | 6.56 | 91.63 | 16.4 | 87.41 | 26.25 | 84 | 29.53 | 83.09 |
| 36.09 | 81.66 | 42.65 | 81.09 | 59.05 | 81.28 | 62.33 | 81.21 | 65.62 | 81.51 |
| 75.46 | 80.86 | 78.74 | 81.35 | 88.58 | 81.48 | 101.7 | 81.34 | 111.55 | 81.46 |
| 121.39 | 81.3 | 134.51 | 81.4 | 150.92 | 81.43 | 157.48 | 81.36 | 183.72 | 81.41 |
| 190.28 | 81.52 | 206.69 | 81.38 | 232.93 | 81.41 | 246.06 | 81.48 | 255.9 | 81.65 |
| 259.18 | 81.45 | 265.74 | 81.55 | 272.3 | 81.46 | 301.83 | 81.55 | 308.39 | 81.43 |
| 324.8 | 81.51 | 334.64 | 81.48 | 364.16 | 81.72 | 374.01 | 81.57 | 387.13 | 81.64 |
| 390.41 | 81.75 | 400.25 | 81.6 | 436.34 | 81.59 | 449.46 | 81.71 | 452.74 | 81.64 |
| 488.83 | 81.74 | 495.39 | 81.65 | 518.36 | 81.82 | 534.76 | 81.74 | 541.33 | 81.88 |
| 547.89 | 81.76 | 561.01 | 81.74 | 583.97 | 81.91 | 606.94 | 81.77 | 623.34 | 81.82 |
| 639 75 | 81 98 | 656 15 | 81 77 | 659 43 | 81 88 | 675 84 | 81 82 | 702 08 | 81 94 |

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790.66
875.96
                 81.89
                            813.63
                                          82.01
82.13
                                                      836.59
                                                                    81.96
                                                                               843.15
                                                                                             82.07
82.26
                                                                                                          869.4
                                                                                                                       82.14
82.18
  944.86
                 82.29
                            964.54
                                           82.18
                                                       971.1
                                                                     82.3
                                                                               987.51
                                                                                              82.21
                                                                                                        994.07
                                                                                                                       82.31
 1026.88
                 82.21 1033.44
                                           82.35 1049.84
                                                                    82.39 1069.53
                                                                                              82.25 1082.65
 1089.21
                 82.25 1095.77
                                          82.38 1122.02
                                                                    82.42 1144.98
                                                                                             82.67 1151.55
                                                                                                                        82.6
                 81.91 1167.95
82.33 1256.53
                                          82.21 1184.35
82.16 1259.81
                                                                                             82.27 1233.56
82.42 1276.21
                                                                    82.14 1204.04
                                                                    82.35 1269.65
 1243.41
 1315.58
                 82.41 1318.86
82.41 1400.88
                                          82.36 1354.95
82.57 1407.45
                                                                    82.5 1368.08
82.42 1423.85
                                                                                             82.41 1384.48
82.36 1436.97
                 82.45 1482.9
82.46 1548.52
82.61 1597.73
                                                                                             82.43 1518.99
82.5 1584.61
82.64 1627.26
  1450.1
                                           82.62 1489.47
                                                                     82.4 1505.87
                                                                                                                       82.57
                                          82.62 1489.47
82.49 1564.92
82.72 1607.57
82.67 1676.47
82.87 1755.21
                                                                    82.62
82.59
                                                                             1568.2
1620.7
 1594.45
                                                                                                                       82.87
 1630.54
1725.68
                 82.74 1663.35
82.75 1735.52
                                                                    82.77 1679.75
82.8 1761.77
                                                                                             82.68 1706
82.87 1797.86
                                                                                                                       82 68
                                                                                                                       82.74
 1810.98
                 82.79 1824.1
82.85 1906.12
                           1824.1
                                          82.69 1840.51
82.97 1922.53
                                                                    82.77 1847.07
82.83 1929.09
                                                                                             82.96 1873.32
82.93 1938.93
                                                                                                                       82.81
 1893
1942.21
                                          83.04 1961.9
80.71 1988.14
69.93 2017.67
                                                                    83.52 1965.18
78.31 1991.42
67.35 2020.95
                                                                                             84.04 1971.74
77.3 1997.99
63.89 2024.23
                 82.99 1955.34
81.64 1981.58
                                                                                                                       83.06
 1978.3
                 72.14 2014.39
                                                                                                                       62.38
 2027.51
2092.51
                 62.21 2045.51
52.7 2101.51
                                          54.52 2054.51
53.3 2110.51
                                                                     53.5 2073.51
53.3 2119.51
                                                                                             52.87 2082.51
52.9 2130.51
                                                                                                                        53.4
                 53.6 2158.51
62.27 2178.29
72.57 2204.51
72.49 2247.11
 2140.51
2171.74
                                          54.8 2164.51
63.19 2181.57
                                                                    55.51 2166.51
64.17 2191.4
                                                                                             56.39 2168.46
71.27 2194.68
                                                                                                                       62.21
                                                                                             71.27 2194.68
71.96 2237.28
76.65 2266.77
78.35 2342.82
77.16 2442.82
78.9 2542.82
                                                                    71.4 2230.72
75.43 2263.49
                                          71.53 2211.06
72.94 2256.94
 2197.95
                                                                                                                       72.49
                                           78.36 2302.82
 2273.32
                 77.29 2286.43
                                                                    78.35 2322.82
                                                                                                                       76.58
 2362.82
2462.82
                 76.41 2382.82
77.95 2482.82
                                          76.71 2402.82
78.54 2502.82
                                                                    76.71 2422.82
78.9 2522.82
                                                                                                                       77.95
                                                                                             80.02 2662.82
80.11 2782.82
 2562.82
                 79 43 2582 82
                                           79.69 2602.82
                                                                    79.82 2622.82
                                                                                                                       79 99
 2682.82
                                           80.15 2742.82
                                                                    80.15 2762.82
                 80.18 2702.82
                                                                                                                       80.18
                                          80.08 2902.82
79.75 3142.82
79.55 3302.82
                 80.11 2862.82
79.78 3022.82
 2822.82
                                                                    79.98 2942.82
                                                                                              80.01 2982.82
                                                                                                                       79.88
                                                                                             79.78 3202.82
79.39 3342.82
                                                                    79.75 3162.82
 3222.82
                 79.55 3262.82
                                                                    79.32 3322.82
                                                                                                                       79.39
                                          79.22 3402.82
83.42 3502.82
                                                                    79.71 3422.82
83.49 3562.82
                                                                                             79.81 3442.82
83.48 3602.82
                 79.19 3382.82
                 83.45 3482.82
                                                                                                                       83.42
 3462.82
 3622.82
3742.82
                                                                    83.22 3682.82
83.02 3862.82
                                                                                             83.22 3702.82
82.92 3902.82
                 83.35 3642.82
                                          83.35 3662.82
                                                                                                                       83 29
                 83.29 3802.82
                                           83.05 3842.82
 3922.82
                 82.82 3962.82
                                          82.86 4002.82
                                                                    82.69 4042.82
                                                                                             82.66 4062.82
                                                                                                                       82.72
                                                                    82.56 4142.82
                                          82.82 4242.82
82.91 4442.82
82.81 4542.82
                 82.75 4222.82
82.98 4402.82
82.88 4522.82
                                                                    82.82 4282.82
82.91 4462.82
82.81 4582.82
                                                                                             82.95 4302.82
82.98 4482.82
82.68 4622.82
 4202.82
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 4502.82
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                                                                                             80.91 4742.82
80.97 4902.82
80.97 5042.82
81.23 5242.82
                 82.06 4662.82
80.84 4822.82
80.94 4962.82
                                          81.53 4682.82
80.74 4842.82
                                                                    81.24 4722.82
80.74 4882.82
 4642.82
                                                                                                                       80 91
                                          80.74 4842.82
80.81 4982.82
81.26 5182.82
82.25 5302.82
83.69 5442.82
83 5602.82
                                                                   80.81 5022.82
81.26 5202.82
 4942.82
                                                                                                                       80.97
                 81.13 5122.82
                                                                                             83.33 5342.82
83.26 5502.82
82.96 5662.82
82.67 5782.82
82.83 5882.82
                                                                    82.67 5322.82
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                 81.56 5282.82
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                 83.46 5422.82
83.13 5562.82
                                                                   83.69 5482.82
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 5542.82
                                          82.76 5742.82
82.73 5842.82
                                                                   82.76 5762.82
82.73 5862.82
 5702.82
5802.82
                 82.83 5722.82
82.6 5822.82
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                 82.83 5922.82
83.74 6042.82
 5902 82
                                           83 02 5942 82
                                                                    83 02 5962 82
                                                                                              83.12 6002.82
                                                                                                                       83.25
                                                                                             75.11 6102.82
74.16 6262.82
                                                                    76.03 6082.82
                                                                                                                       74.16
                 74.03 6162.82
                                           74.13 6202.82
                                                                    74.23 6222.82
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                                          74.23 6342.82
77.05 6442.82
                                                                    74.23 6362.82
77.05 6462.82
                 74.26 6302.82
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                 74.72 6422.82
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80.39 6662.82
                                                                    82.72 6582.82
80.22 6682.82
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80.29 6702.82
                 80.39 6642.82
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                                          79.04 6762.82
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78.19 6882.82
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77.1 7002.82
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                 79.04 6742.82
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                 77.83 6842.82
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                 76.81 6942.82
                                           76.81 6962.82
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                 78.87 7042.82
77.3 7142.82
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77.3 7162.82
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80.41 7202.82
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 7122.82
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                                          82.78 7262.82
76.84 7362.82
                                                                    77.92 7282.82
78.44 7382.82
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78.28 7402.82
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78.28
 7422.82
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                 77.95 7442.82
79.26 7542.82
                                          77.95 7462.82
79.26 7562.82
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79.65 7602.82
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79.78 7622.82
                                                                    82.11 7702.82
85.03 7802.82
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 7642.82
                 81.29 7662.82
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                                          84.74 7782.82
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                 84.34 7762.82
 7842.82
                 85.78 7862.82
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                                          79.16 7982.82
78.96 8082.82
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                 78.99 7962.82
                                                                    78.43 8002.82
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                 79.68 8062.82
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                                                                    79.45 8102.82
                                                                                              81.52 8122.82
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 8142.82
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80.17 8282.82
                                                                                             81.61 8222.82
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                 83.02 8162.82
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                 81.25 8262.82
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 8362 82
                 84 01 8442 82
                                          87 29 8460 82
                                                                    89 78 8473 82
                                                                                              91 76 8482 82
                                                                                                                       92 02
                 92.67 8505.82
91.55 8662.82
                                          85.78 8520.82
86.76 8702.82
                                                                    85.35 8742.82
 8622.82
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                 83.21 8862.82
82.79 9062.82
                                          83.05 8902.82
82.82 9142.82
                                                                   82.98 8942.82
82.49 9182.82
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82.49 9222.82
 8822.82
 9022.82
 9342.82
                82.19 9382.82
                                          81.86 9462.82
                                                                   81.99 9502.82
                                                                                             81.96
Manning's n Values
                                        num=
                                                        5
                               Sta n Val Sta
55.18 .07 2017.67
       Sta n Val Sta
0 .066 1965.18
                                                                   n Val
                                                                                             n Val Sta
.07 2286.43
                                                                    .025 2191.4
                                         Lengths: Left Channel Right
Bank Sta: Left Right
                                                                                              Coeff Contr.
                                                                                                                       Expan.
Bank Sta: Lett Right Long....

1971.74 2286.43 1454

Ineffective Flow num= 2

Sta L Sta R Eley Permanent
                                         1454.61 1509.52 1621.49
2
    Sta L Sta R
0 1971.74
 2286.43 9502.82
                             78.36
                    Station= .07
Station= 8492.82
Right Levee
                                                           Elevation=
CROSS SECTION OUTPUT Profile #Design Flow
                                                            Element
                                                                                                                     Channel
                                                                                                                                      Right OE
                                                           Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
  Vel Head (ft)
                                               0.04
                                                                                                       0.066
                                                                                                                        0.048
                                                                                                                                          0.066
  W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                                     1509.52
                                                                                                                                       1621.49
                                                                                                  18270.20
                                                                                                                     8805.66
                                                                                                                                     69784.63
                                                                                                                                     71868.71
                                      0.000106
  E.G. Slope (ft/ft)
Q Total (cfs)
                                                           Area (sq ft)
Flow (cfs)
                                                                                                  20041.18
                                                                                                                     8805.66
25316.60
                                        125000.00
                                                                                                   18660.40
                                                                                                                                       81022.99
                                                           Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
  Top Width (ft)
Vel Total (ft/s)
                                          8484.78
                                                                                                   1967.75
                                                                                                                      314.69
                                                                                                                                       6202.34
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                              39 71
                                                                                                         9 28
                                                                                                                       27 98
                                                                                                                                          11 25
                                         12161020.0
                                                                                                                        2463005.0
                                                                                                                                      6209.75
                                         1561.12
                                                                                                                      328.98
         Ch El (ft)
                                            52.70
                                                            Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                                        0.06
                                                                                                                         0.18
  Alpha
                                                                                                                          0.51
  Frctn Loss (ft)
C & E Loss (ft)
                                                           Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                  23833.31
6258.34
                                                                                                                   16307.14
858.33
                                                                                                                                     20600.86
```

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 131.35

Description: Cross-Section data supplemented on the right by IBWC cross-section 131.35 from station. 2912.94=2950-37.06 feet (the approximate

| | | | | lative lo | | | etric e | levations | |
|--------------------|----------------|--|-------------------------|---|-----------------|-------------------------------|----------------|--------------------|----------------|
| Station E | | | rom IBWC | 2008 Cro | ss-sect | lons | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | | Elev |
| 0 | 81.56 | 3.28 | 82.18 | 9.84 | 84.65 | 19.68 | 89 | | 91.16 |
| 32.8
59.05 | 92.9
92.09 | | 93.59
90.78 | 39.36
68.89 | 93.89
89.68 | 49.2
75.45 | 94.03
85.67 | 52.49
78.73 | 93.56
84.09 |
| 85.29 | 82.36 | 91.85 | | 98.41 | 80.71 | 104.97 | 79.9 | | 79.42 |
| 121.37 | 79.46 | 124.65 | | 131.21 | 76.61 | 134.49 | 76.48 | | 76.48 |
| 665.91 | 76.49 | 669.19 | 77 | 672.47 | 77.99 | 675.75 | 78.36 | 682.31 | 77.83 |
| 692.15 | 77.46 | 705.27 | 76.73 | 708.55 | 76.74 | 721.67 | 77.28 | 734.79 | 77.2 |
| 754.48
800.4 | 77.34
77.36 | 761.04
813.52 | 77.29
77.31 | 767.6
823.36 | 77.38
77.42 | 780.72
846.32 | 77.38
77.29 | 793.84
852.89 | 77.29
77.38 |
| 872.57 | 77.38 | 879.13 | 77.47 | 885.69 | 77.39 | 918.49 | 77.47 | 934.89 | 77.4 |
| 938.17 | 77 52 | 0/// 72 | 77 /2 | 967.7 | 77.48 | 984.1 | 77.35 | 997.22 | 77.46 |
| 1033.3 | 77.46 | 1043.14
1095.63
1148.12
1223.56 | 77.4 | 1049.71 | | 1056.27 | | 1066.11 | 77.54 |
| 1072.67 | 77.47 | 1095.63 | 77.47 | 1112.03 | 77.35 | 1115.31 | 77.44 | 1125.15 | 77.37 |
| 1131.71 | 77.43 | 1148.12 | 77.38 | 1151.4 | 77.49 | 1164.52 | 77.36 | 1190.76 | 77.39 |
| 1200.6
1269.49 | 77 20 | 1272.77 | 77 45 | 1236.68
1295.73 | 77.47 | 1243.25
1305.57 | 77 20 | 1246.53
1312.13 | 77.44
77.45 |
| 1328.53 | 77.38 | 1335.1 | | | 77.46 | 1351.5 | | 1361.34 | |
| 1371.18 | | 1390.86 | | 1403.98 | | 1420.38 | | 1443.35 | 77.64 |
| 1449.91 | 77.6 | 1463.03 | 77.66 | 1466.31 | 77.58 | 1482.71 | | 1499.11 | 77.66 |
| 1512.23 | | 1518.79 | | 1535.2 | | 1561.44 | 78.07 | 1584.4 | 78.18 |
| 1587.68 | | 1597.52 | 78.22 | 1607.36 | 78.56 | 1613.92 | | 1623.77 | 78.72 |
| 1630.33 | | 1633.61 | 79.44 | 1643.45
1695.93 | 80.92 | 1650.01
1738.58
1787.78 | | | 81.91 |
| 1682.81
1754.98 | 82.53 | 1689.37
1768.1 | 82.24 | 1774 66 | 82.19 | 1787.78 | | 1741.86 | 82.48
82.64 |
| 1800.9 | | 1817.31 | 82.69 | 1830.43 | 82.75 | 1836.99 | 82.9 | 1853.39 | 82.81 |
| 1869.79 | 82.84 | 1879.63 | 82.63 | | | 1899.31 | 82.74 | | 82.66 |
| 1938.68 | 82.71 | 1945.24 | 82.66 | | | 1968.2 | 82.83 | 1984.6 | 82.79 |
| 2004.29 | | | 81.94 | | | 2040.37 | | | 81.15 |
| 2053.49 | | | 80.74 | | | 2109.26 | | | 81.01 |
| 2132.22 | 81.22 | 2138.78 | 81.56 | 2148.62 | 81.68 | 2155.18
2187.98 | 80.81 | 2158.46 2194.54 | 80.63 |
| 2165.02 | 80 63 | 21/4.80 | 81.05 | 2181.42 | 80 76 | 2187.98 | 80 99 | 2194.54 | 80.61
80.85 |
| 2247.03 | 80.95 | 2260.15 | 80.84 | 2269.99 | 80.97 | 2279.83 | 80.9 | 2289.67 | 80.25 |
| 2292.95 | 80.41 | 2302.79 | 80.47 | 2306.07 | 80.58 | 2312.64 | 80.48 | 2325.76 | 79.26 |
| 2332.32 | 78.51 | 2352 | 77.18 | 2355.28 | 77.11 | 2361.84 | 77.77 | 2374.96 | 79.3 |
| 2381.52 | 79.74 | 2384.8 | 80.12 | 2391.36 | 79.82 | 2397.92 | 79.33 | 2401.2 | 78.78 |
| 2411.05 | 74.84 | 2414.33 | 73.81 | 2420.89 | 72.51 | 2424.17 | 71.63 | 2430.73 | 68.93 |
| 2434.01 | 67.ZI | 2437.29 | 64.94
5Ω 24 | 2181.42
2214.23
2269.99
2306.07
2355.28
2391.36
2420.89
2440.57
2478.41
2528.41
2628.41
2647.23
2666.91
2712.84
2775.17
2847.33
2893.26 | 63.25
57 Ω/I | 2447.13 | 57.54 | 2450.41 | 62.02
57.84 |
| 2508 41 | 57 84 | 2518 41 | 57 44 | 2528 41 | 57.04 | 2538 41 | 56 84 | 2548 41 | 56.84 |
| 2558.41 | 56.54 | 2568.41 | 56.04 | 2578.41 | 55.84 | 2588.41 | 55.54 | 2598.41 | 55.74 |
| 2608.41 | 55.44 | 2618.41 | 55.24 | 2628.41 | 56.74 | 2630.83 | 62.21 | 2634.11 | 63.59 |
| 2637.39 | 65.64 | 2640.67 | 67.03 | 2647.23 | 69.03 | 2650.51 | 70.29 | 2657.07 | 73.84 |
| 2660.35 | 76.45 | 2663.63 | 78.48 | 2666.91 | 79.15 | 2670.19 | 79.12 | 2683.32 | 78.09 |
| 2689.88 | 78.01 | 2706.28 | 78.46 | 2712.84 | 78.47 | 2735.8 | 78.81 | 2742.36 | 78.64
78.6 |
| 2732.2 | 78 58 | 2837 49 | 78 82 | 2847 33 | 78 91 | 2853 89 | 70.03 | 2867 02 | 79.07 |
| 2876.86 | 79.32 | 2886.7 | 79.44 | 2893.26 | 80.18 | 2899.82 | 81.44 | 2906.38 | 83.46 |
| 2909.66 | 84.22 | 2912.94 | 84.59 | 2918.94 | 83.04 | 2939.94 | 82.64 | 4093.94 | 77.74 |
| 4109.94 | 81.94 | 5856.94 | 81.74
82.74
74.04 | 5862.94 | 81.64 | 5881.94 | 83.14 | 5891.94 | 82.34 |
| 5962.94 | 82.34 | 6062.94 | 82.74 | 6108.94 | | 6115.94 | | | 74.84 |
| 6162.94 | 74.44 | 6175.94 | 74.04 | 6262.94 | 74.04 | 6362.94 | 74.64 | 6462.94 | 75.14 |
| 6516.94
7896.94 | 84 64 | 8504 94 | 83.94 | 6262.94
6576.94
8548.94 | 84 64 | 2575 94 | 92 64 | 7878.94
8583 94 | 84.64
92.64 |
| 7050.51 | 01.01 | 0301.31 | 03.01 | 0510.51 | 01.01 | 0373.71 | J2.01 | 0505.51 | 52.01 |
| Manning's | n Value | es | num= | 5 | | | | | |
| Sta | n Val | Sta | | Sta | n Val | Sta | n Val | Sta | n Val |
| 0 | .099 | 2391.36 | .066 | 2437.29 | .015 | 2663.63 | .066 | 2689.88 | .088 |
| Bank Sta: | Left. | Right | Lenaths | s: Left ጣ | nannel | Right. | Coeft | E Contr. | Expan. |
| 2 | 384.8 26 | 566.91 | 2 | : Left Ch
2159.16
Elev | 2175 2 | 2278.61 | | .1 | . 3 |
| Left Leve | e 5 | Station= | 49.2 | Elev | ation= | 94.03 | | | |
| Kigiic Lev | ee . | station- | 03/3.94 | FIE | ation= | 92.64 | | | |
| Blocked 0 | | | num=
Sta L | 2
C+ 2 D | E10 | | | | |
| | | | 2929.58 | | Elev
82.88 | | | | |
| anaaa ana | | | | | 52.00 | | | | |

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 92.21 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|-----------|-----------|-----------|
| Vel Head (ft) | 0.26 | Wt. n-Val. | 0.099 | 0.030 | 0.088 |
| W.S. Elev (ft) | 91.95 | Reach Len. (ft) | 2159.16 | 2175.00 | 2278.61 |
| Crit W.S. (ft) | 85.86 | Flow Area (sq ft) | 21923.73 | 8367.36 | 53512.16 |
| E.G. Slope (ft/ft) | 0.000181 | Area (sq ft) | 21923.73 | 8367.36 | 53512.16 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 19771.44 | 52185.61 | 53042.94 |
| Top Width (ft) | 8513.89 | Top Width (ft) | 2325.07 | 282.11 | 5906.71 |
| Vel Total (ft/s) | 1.49 | Avg. Vel. (ft/s) | 0.90 | 6.24 | 0.99 |
| Max Chl Dpth (ft) | 36.71 | Hydr. Depth (ft) | 9.43 | 29.66 | 9.06 |
| Conv. Total (cfs) | 9278634.0 | Conv. (cfs) | 1467616.0 | 3873690.0 | 3937329.0 |
| Length Wtd. (ft) | 2215.47 | Wetted Per. (ft) | 2327.60 | 294.11 | 5909.26 |
| Min Ch El (ft) | 55.24 | Shear (lb/sq ft) | 0.11 | 0.32 | 0.10 |
| Alpha | 7.54 | Stream Power (lb/ft s) | 0.10 | 2.01 | 0.10 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 23132.64 | 16009.58 | 18267.25 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 6186.67 | 847.99 | 4429.36 |

Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 130.93

INPUT
Description: Cross-Section data supplemented on the right by IBWC cross-section 131.93 from right bank station. 2655.70=3740-1084.3 feet (the approximate difference at the relative bank stations). Bathymetric elevations translated from IBWC 2008 Cross-sections

| Station : | | | translate
num= | d from
458 | IBWC 2008 | Cross- | sections | | |
|--------------------|----------------|--------------------|-------------------|--------------------|-----------|--------------------|----------------|--------------------|----------------|
| Station | Elev | Sta | | Sta | | Sta | Elev | Sta | Elev |
| 0 | 93.31 | 6.56 | 93.13 | 9.84 | | 16.39 | 91.2 | 19.67 | 90.69 |
| 22.95
49.18 | 89.94
81.43 | 29.51
52.46 | 86.35
81.39 | 32.78
55.73 | | 36.06
65.57 | 83.52
78.99 | 42.62
72.13 | 82.13
78.12 |
| 75.41 | 77.8 | 78.68 | 77.75 | 957.32 | 77.75 | 967.16 | 78.19 | 977 | 78.17 |
| 990.11
1049.12 | 78.23 | 999.95
1058.96 | | 1009.78
1072.07 | | 1029.45
1095.02 | | 1039.29
1262.23 | 78.32
77.75 |
| 1265.5 | | 1268.78 | | 1275.34 | | 1278.62 | 80.28 | 1281.9 | 80.24 |
| 1291.73 | 79.88 | 1301.57 | 79.26 | 1311.4 | 79.26 | 1324.52 | | 1337.63 | 79.1 |
| 1350.74 | | 1360.58 | | 1376.97 | | 1390.09 | | 1399.92 | 79.34
79.45 |
| 1416.31
1495 | 79.29
79.58 | 1422.87
1501.56 | | 1435.99
1524.51 | | 1442.54
1527.78 | | 1458.94
1557.29 | 79.45 |
| 1563.85 | | 1580.24 | | 1586.8 | | 1603.19 | 79.9 | 1619.58 | 79.87 |
| 1632.7 | | 1645.81 | | 1649.09 | | 1668.76 | | 1675.32 | 80.04 |
| 1691.71
1744.17 | 80.15 | 1704.82
1754 | | 1714.66
1770.39 | | 1724.49
1790.06 | | 1734.33
1796.62 | 80.27
80.4 |
| 1809.73 | | 1819.57 | | 1842.52 | | 1852.36 | | 1868.75 | 80.67 |
| 1878.58 | | 1885.14 | | 1908.09 | | 1960.55 | 81.07 | | 81.03 |
| 1996.61
2072.02 | | 2026.12
2078.57 | | 2035.95
2081.85 | | 2045.79
2085.13 | | 2062.18
2098.24 | 81.71
80.52 |
| 2104.8 | | 2108.08 | | 2111.36 | | 2117.91 | | 2124.47 | 78.78 |
| 2127.75 | | 2137.59 | | 2190.04 | | 2196.6 | | 2203.16 | 78.73 |
| 2212.99
2258.89 | | 2219.55
2262.17 | | 2226.11
2278.56 | | 2232.66
2285.12 | | 2245.78
2308.07 | 78.71
79.22 |
| 2311.35 | | 2321.18 | | 2324.46 | | 2331.02 | 78.9 | 2334.3 | 78.99 |
| 2340.85 | | 2344.13 | | 2347.41 | 77.09 | 2353.97 | | 2360.53 | 74.29 |
| 2363.8
2383.48 | | 2367.08
2386.76 | | 2373.64 2390.04 | | 2376.92
2393.32 | 73.57 | 2380.2
2399.88 | 75.26
71.03 |
| 2403.16 | | 2406.44 | 67.74 | 2413 | | 2416.28 | | 2419.56 | 64.73 |
| 2422.84 | | 2426.12 | | 2462.56 | | 2477.56 | | 2477.56 | 57.21 |
| 2482.56
2502.56 | | 2487.56
2508.56 | | 2489.56
2509.56 | | 2496.56
2515.56 | | 2498.56
2520.56 | 56.5
56.5 |
| 2522.56 | | 2529.56 | | 2532.56 | | 2536.56 | | 2543.56 | 56.1 |
| 2543.56 | 56.13 | 2549.56 | 56.1 | 2555.56 | 56.1 | 2556.56 | 56.13 | 2563.56 | 56.25 |
| 2567.56
2590.56 | | 2570.56
2591.56 | | 2577.56
2598.56 | | 2578.56
2602.56 | | 2584.56
2605.56 | 55.85
56.03 |
| 2612.56 | | 2613.56 | | 2614.56 | | 2615.56 | | 2616.06 | 56.76 |
| 2616.35 | 57.18 | 2616.35 | 62.17 | 2619.62 | 62.57 | 2622.9 | 64.47 | 2626.18 | 67.63 |
| 2629.46 | 70.25
76.27 | 2632.74 | | 2636.02 2675.7 | | 2639.3 | | 2645.86 | 75.43 |
| 2649.14
2755.7 | 81.36 | 2655.7
2775.7 | 79.5
81.1 | 2795.7 | | 2695.7
2815.7 | 81.5
81 | 2715.7
2835.7 | 81.36
81 |
| 2855.7 | 80.77 | 2875.7 | 80.51 | 2895.7 | | 2915.7 | 80.47 | 2935.7 | 80.47 |
| 2955.7 | 80.31 | 2975.7 | 80.34 | 2995.7 | | 3015.7 | 80.28 | 3035.7 | 80.28 |
| 3055.7
3155.7 | 80.37
79.85 | 3075.7
3175.7 | 80.21
79.78 | 3095.7
3195.7 | | 3115.7
3215.7 | 80.05
79.52 | 3135.7
3235.7 | 80.05
79.52 |
| 3255.7 | 79.45 | 3275.7 | 79.32 | 3295.7 | | 3315.7 | 79.06 | 3335.7 | 79.06 |
| 3355.7 | 79.35 | 3375.7 | 79.12 | 3395.7 | | 3415.7 | 78.93 | 3435.7 | 78.93 |
| 3455.7
3555.7 | 78.66
78.3 | 3475.7
3575.7 | 78.7
78.23 | 3495.7
3595.7 | | 3515.7
3615.7 | 78.2
77.84 | 3535.7
3635.7 | 78.2
77.84 |
| 3655.7 | 77.25 | 3675.7 | 77.05 | 3695.7 | | 3715.7 | 77.12 | 3735.7 | 77.12 |
| 3755.7 | 76.72 | 3775.7 | 76.89 | 3795.7 | | 3815.7 | 76.66 | 3835.7 | 76.66 |
| 3855.7
3995.7 | 76.26
76.36 | 3875.7
4015.7 | 76.59
76.78 | 3935.7
4035.7 | | 3955.7
4055.7 | 76.62
77.05 | 3975.7
4075.7 | 76.59
76.72 |
| 4135.7 | 76.72 | 4155.7 | 76.68 | 4175.7 | | 4195.7 | 76.72 | 4215.7 | 76.72 |
| 4235.7 | 76.81 | 4255.7 | 77.11 | 4275.7 | 76.95 | 4295.7 | 77.21 | 4315.7 | 81.64 |
| 4335.7
4435.7 | 80.98
82.52 | 4355.7
4455.7 | 79.83
83.01 | 4375.7
4475.7 | | 4395.7
4495.7 | 81.86
83.24 | 4415.7
4515.7 | 82.52
82.85 |
| 4535.7 | 82.85 | 4555.7 | 82.49 | 4575.7 | | 4595.7 | 82.16 | 4615.7 | 82.03 |
| 4655.7 | 82.03 | 4675.7 | 82.02 | 4695.7 | 81.93 | 4715.7 | 81.89 | 4735.7 | 81.89 |
| 4755.7
4855.7 | 82.02 | 4775.7
4875.7 | 82.22
82.68 | 4795.7
4895.7 | | 4815.7
4915.7 | 82.65 | 4835.7
4935.7 | 82.65
82.64 |
| 4955.7 | 82.68
82.61 | 4975.7 | 82.45 | 4995.7 | | 5015.7 | 82.64
82.28 | 5035.7 | 82.28 |
| 5055.7 | 82.25 | 5075.7 | 82.15 | 5095.7 | 82.15 | 5115.7 | 82.05 | 5135.7 | 82.05 |
| 5155.7 | 82.02 | 5175.7
5275.7 | 81.89 | 5195.7
5295.7 | | 5215.7 | 81.69 | 5235.7
5335.7 | 81.69 |
| 5255.7
5355.7 | 81.59
81.33 | 5375.7 | 81.59
81.19 | 5395.7 | | 5315.7
5415.7 | 81.36
81 | 5435.7 | 81.36
81 |
| 5455.7 | 81.03 | 5475.7 | 80.86 | 5495.7 | | 5515.7 | 80.67 | 5535.7 | 80.67 |
| 5555.7 | 80.73 | 5575.7 | 80.7 | 5595.7 | 80.37 | 5615.7 | 81.88 | 5635.7 | 81.88 |
| 5655.7
5755.7 | 83.52
84.07 | 5675.7
5775.7 | | 5695.7
5795.7 | | 5715.7
5815.7 | 84.11
84.27 | | 84.11
84.27 |
| 5855.7 | 84.24 | | 84.24 | 5895.7 | | 5915.7 | 83.58 | | 83.58 |
| 5975.7 | 83.45 | 5995.7 | 84.24 | 6035.7 | | 6055.7 | 84.3 | | 84.37 |
| 6095.7
6255.7 | 84.46
84.49 | 6115.7
6275.7 | | 6135.7
6295.7 | | 6155.7
6315.7 | 84.56
84.53 | | 84.56
84.53 |
| 6355.7 | 84.36 | 6375.7 | 84.3 | 6395.7 | | 6415.7 | 84.23 | | 84.23 |
| 6455.7 | | | | 6495.7 | | 6515.7 | 84.39 | | 84.39 |
| 6555.7
6655.7 | 84.49
84.26 | | 84.46
84.32 | 6595.7
6695.7 | | 6615.7
6715.7 | 84.32
84.19 | | 84.32
84.19 |
| 6795.7 | 84.32 | 6835.7 | 84.32 | 6855.7 | | 6875.7 | 84.26 | | 84.26 |
| 6915.7 | 84.42 | 6935.7 | 84.42 | 6955.7 | | 6975.7 | 84.42 | | 84.15 |
| 7015.7
7115.7 | 84.12
83.63 | 7035.7
7135.7 | 84.12
83.63 | 7055.7
7155.7 | | 7075.7
7175.7 | 83.92
83.23 | | 83.76
83.2 |
| 7215.7 | | 7235.7 | | 7255.7 | | 7275.7 | 83.1 | | 82.94 |
| 7315.7 | 83.49 | 7335.7 | 83.49 | 7355.7 | 83.53 | 7424.7 | 79.88 | 7446.7 | 87.21 |
| 7461.7 | 91.41 | 7475.7 | 91.67 | 7484.7 | | 7495.7 | 84.68 | | 74.92 |
| 7575.7
7675.7 | 79.98
82.08 | 7595.7
7695.7 | 90.67
82.99 | 7615.7
7735.7 | | 7635.7
7755.7 | 89
80.7 | | 82.37
80.83 |
| 7795.7 | 81.12 | 7815.7 | 81.09 | 7835.7 | 81.09 | 7855.7 | 81.05 | 7915.7 | 81.05 |
| 7935.7 | 81.02 | 7955.7 | 80.95 | 7975.7 | | 8015.7 | 80.85 | 8055.7 | 80.82 |
| 8075.7
8175.7 | 80.89
81.31 | 8095.7
8215.7 | | 8115.7
8235.7 | | 8135.7
8255.7 | 81.77
79.11 | | 81.31
80.06 |
| 8295.7 | 82.03 | 8315.7 | 82.03 | 8335.7 | 80.59 | 8355.7 | | | 79.73 |
| 8455.7 | 79.79 | 8475.7 | 79.76 | 8495.7 | 79.7 | | | | |
| Manning' | s n Valu | es | num= | 5 | | | | | |
| Sta | n Val | Sta | n Val | Sta | | Sta | | Sta | n Val |
| 0 | .066 | 2331.02 | .07 | 2419.56 | .025 | 2616.35 | .07 | 2655.7 | .066 |
| Bank Sta | : Left | Right | Lengths | : Left | Channel | Right | Coef | f Contr. | Expan. |
| 2 | 340.85 | 2655.7 | 2 | 2220.46 | 2174.42 | | | .1 | . 3 |
| Ineffect
Sta L | | | | | | | | | |
| | 2340.85 | 78.03 | | | | | | | |
| | 8495.7 | | | | | 02.25 | | | |
| Left Lev | ee S | Station= | 0 | EI | evation= | 93.31 | | | |

```
Right Levee
              Station= 7484.7
                                   Elevation= 91.79
```

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 91.82 | Element | Left OB | Channel | Right OB |
|--------------------|------------|------------------------|-----------|----------|--------------|
| Vel Head (ft) | 0.06 | Wt. n-Val. | 0.066 | 0.045 | 0.066 |
| W.S. Elev (ft) | 91.76 | Reach Len. (ft) | 2220.46 | 2174.42 | 1705.80 |
| Crit W.S. (ft) | 82.62 | Flow Area (sq ft) | 29579.87 | 9042.97 | 46843.52 |
| E.G. Slope (ft/ft) | 0.000126 | Area (sq ft) | 29884.88 | 9042.97 | 48950.73 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 40686.83 | 30455.38 | 53857.79 |
| Top Width (ft) | 7468.63 | Top Width (ft) | 2326.98 | 314.85 | 4826.81 |
| Vel Total (ft/s) | 1.46 | Avg. Vel. (ft/s) | 1.38 | 3.37 | 1.15 |
| Max Chl Dpth (ft) | 35.96 | Hydr. Depth (ft) | 12.71 | 28.72 | 9.70 |
| Conv. Total (cfs) | 11131690.0 | Conv. (cfs) | 3623305.0 | 2712159 | .0 4796226.0 |
| Length Wtd. (ft) | 2003.02 | Wetted Per. (ft) | 2329.95 | 329.94 | 4830.05 |
| Min Ch El (ft) | 55.80 | Shear (lb/sq ft) | 0.10 | 0.22 | 0.08 |
| Alpha | 1.85 | Stream Power (lb/ft s) | 0.14 | 0.73 | 0.09 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 21848.63 | 15574.93 | 15587.35 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 6071.37 | 833.09 | 4148.63 |

Note:

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 130.51

Description: Cross-Section data supplemented on the right by IBWC cross-section 131.51 from station. 3443.55=3685-241.45 feet (the approximate difference at the relative location). Bathymetric elevations translated from IBWC 2008 Cross-sections

| 0 | | | from IBW0 | | coss-sect | tions | | | |
|--------------------|----------------|--------------------|---------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|
| Station Sta | | | num=
Elev | 308
Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 90.48 | | | 6.56 | 91.48 | 16.4 | 91.84 | | 91.59 |
| 26.24 | 91.09 | | | 42.64 | 85.66 | 52.47 | 81.85 | 55.75 | 81.18 |
| 62.31 | 80.34 | | 80.16 | 72.15 | 80.28 | 78.71 | 80.16 | 101.67 | 80.41 |
| 114.79 | 80.16 | | 80.2 | 137.74 | 80.35 | 147.58 | 80.22 | 154.14 | 80.32 |
| 160.7 | 80.22 | | 80.3 | 180.38 | 80.19 | 190.22 | 80.32 | 206.62 | 80.37 |
| 219.73 | 80.22 | | 80.4 | 259.09 | 80.24 | 291.89 | 80.23 | 314.84 | 80.19 |
| 331.24 | 80.27 | 344.36 | 80.21 | 364.04 | 80.26 | 383.72 | 80.23 | 400.11 | 80.32 |
| 406.67 | 80.22 | 423.07 | 80.18 | 432.91 | 80.28 | 449.31 | 80.29 | 459.15 | 80.2 |
| 465.71 | 80.26 | 488.66 | 80.11 | 498.5 | 80.2 | 505.06 | 80.04 | 511.62 | 80.18 |
| 521.46 | 80.12 | 534.58 | 80.18 | 557.54 | 80.09 | 570.65 | 80.21 | 580.49 | 80.08 |
| 603.45 | 80.18 | 610.01 | 80.09 | 632.97 | 80.18 | 649.36 | 80.05 | 675.6 | 80.2 |
| 685.44
757.59 | 80.11
80.13 | 695.28
764.15 | 80.2
80.31 | 714.96
770.71 | 80.07 | 734.63
780.55 | 80.17
80.29 | 741.19
793.67 | 80.09
80.24 |
| 800.23 | 80.13 | 806.79 | 80.18 | 816.62 | 80.17
80.25 | 823.18 | 80.29 | 839.58 | 80.24 |
| 849.42 | 80.12 | 855.98 | 80.19 | 872.38 | 80.05 | 892.06 | 80.06 | 898.61 | 80.14 |
| 911.73 | 80.01 | 918.29 | 80.1 | 928.13 | 80.05 | 944.53 | 80.11 | 954.37 | 80 |
| 967.49 | 80.14 | 977.33 | 80.06 | 997 | | 1003.56 | | 1019.96 | 80 |
| 1023.24 | | 1036.36 | | 1042.92 | | 1052.76 | | 1069.15 | 80.03 |
| 1082.27 | 80.14 | 1085.55 | 80.05 | 1101.95 | 79.99 | 1115.07 | 80.08 | 1121.63 | 80.01 |
| 1131.47 | 80.11 | 1141.31 | 79.93 | 1160.98 | 79.91 | 1164.26 | 79.99 | 1187.22 | 80.09 |
| 1193.78 | | 1200.34 | | 1213.46 | 80.01 | 1249.53 | 80.18 | 1269.21 | 80.58 |
| 1275.77 | 80.61 | 1285.61 | 80.12 | 1302.01 | | 1311.84 | | 1324.96 | 79.96 |
| 1347.92 | 80.11 | 1374.16 | 80.04 | 1393.83 | 80.14 | 1400.39 | | 1406.95 | 80.11 |
| 1420.07 | 80.01 | 1423.35
1515.18 | 80.11 | 1439.75 | | 1449.59 | | 1456.15 | 80.06 |
| 1492.22 | 80.09 | 1515.18 | | 1528.3 | | 1554.54 | | 1564.37 | 80.16 |
| 1570.93 | | 1613.57
1685.72 | | 1620.13 | | 1646.36 | 80.23 | 1656.2
1718.52 | 80.12 |
| 1679.16
1738.19 | | 1741.47 | | 1702.12
1754.59 | 80.24 | 1705.4
1761.15 | | 1787.39 | 80.18
80.25 |
| 1793.95 | | 1810.34 | | 1816.9 | | 1830.02 | 80.17 | 1836.58 | 80.38 |
| 1856.26 | | 1862.82 | | 1879.22 | | 1889.05 | 80.23 | 1892.33 | 80.19 |
| 1912.01 | | 1921.85 | | 1928.41 | | 1941.53 | | 1948.09 | 80.39 |
| 1964.48 | | 1967.76 | | 1974.32 | 80.24 | 1994 | | 2000.56 | 80.27 |
| 2007.12 | | 2013.68 | | 2020.24 | | 2030.08 | 80.29 | | 80.44 |
| 2046.48 | 80.32 | 2066.15 | | 2079.27 | | 2102.23 | 80.48 | 2112.07 | 80.28 |
| 2128.47 | | 2148.15 | | 2154.71 | | 2167.82 | | 2177.66 | 80.51 |
| 2180.94 | | 2187.5 | | 2200.62 | | 2207.18 | 80.54 | 2223.58 | 80.42 |
| 2230.14 | | 2243.26 | | 2249.82 | | 2256.38 | 80.41 | 2276.05 | 80.47 |
| 2285.89 | | 2289.17 | | 2305.57 | | 2308.85 | | 2328.53 | 80.4 |
| 2331.81 | | 2351.49 | | 2364.61 | 80.43 | 2381 | 80.45 | 2397.4 | 80.58 |
| 2407.24
2479.4 | | 2423.64
2489.23 | | 2449.88
2508.91 | 80.56 | 2459.72
2525.31 | | 2466.28
2535.15 | 80.55
80.74 |
| 2554.83 | | 2564.67 | | 2567.95 | 80.66 | 2607.3 | | 2613.86 | 80.74 |
| 2630.26 | | 2636.82 | | 2643.38 | | 2649.94 | | 2666.34 | 80.68 |
| 2679.46 | 80.92 | | | 2702.42 | | 2718.81 | | 2728.65 | 81.21 |
| 2741.77 | | 2745.05 | | 2751.61 | | 2754.89 | | 2761.45 | 82.97 |
| 2768.01 | 83.59 | 2771.29 | 83.21 | 2777.84 | 81.72 | 2784.4 | 81.26 | 2790.96 | 81.44 |
| 2800.8 | 80.93 | 2813.92 | 80.77 | 2820.48 | 80.98 | 2830.31 | 80.98 | 2843.43 | 81.14 |
| 2849.99 | | 2856.55 | | 2863.11 | | 2866.39 | | 2872.94 | 80.49 |
| 2879.5 | | 2905.74 | 80.3 | 2912.3 | | 2931.97 | | 2954.93 | 80.52 |
| 2964.77 | 80.4 | 3007.4 | 80.18 | 3013.96 | | 3020.51 | | 3033.63 | 81.15 |
| 3043.47 | | 3050.03 | | 3053.31 | | 3056.59 | | 3063.15 | 75.83
62.69 |
| 3066.43
3089.38 | | 3069.71
3093.38 | | 3076.26
3103.38 | | 3082.82 | 64.51 | 3086.1
3123.38 | 57.55 |
| 3133.38 | | 3143.38 | | 3153.38 | 57.75 | 3113.38
3163.38 | | 3173.38 | 58.15 |
| 3193.38 | | 3203.38 | | 3213.38 | 58.85 | 3223.38 | | 3233.38 | 58.95 |
| 3253.38 | | 3263.38 | | 3273.38 | 60.85 | 3295.98 | 62.17 | | 62.24 |
| 3305.82 | 64.16 | 3309.1 | | 3312.38 | | | | 3322.21 | 70.46 |
| 3328.77 | | 3335.33 | | 3341.89 | | 3348.45 | | 3351.73 | 78.68 |
| 3355.01 | | 3368.12 | 77.95 | 3374.68 | | 3394.36 | 77.68 | 3414.04 | 77.33 |
| 3417.32 | | 3430.43 | 75.94 | 3436.99 | 75.57 | 3443.55 | 75.39 | 3482.55 | 76.53 |
| 3996.55 | | 4158.55 | | 4589.55 | | 5039.55 | 74.54 | 5134.55 | 84.24 |
| 5439.55 | 82.44 | 5440.55 | 92.74 | 7263.55 | 92.74 | | | | |
| | | | | _ | | | | | |
| Manning' | | | num= | 5 | - 77-1 | Q+- | - 17-1 | O+- | - 17-1 |
| 5ta
0 | n Val | Sta
3050.03 | | Sta
3082.82 | n Val | Sta
3305.82 | n Val | Sta
3355.01 | n Val
.067 |
| U | .074 | 3030.03 | .000 | 3002.02 | .015 | 3303.62 | .000 | 3333.01 | .007 |
| Bank Sta | : Left | Right | Lengths | : Left 0 | hannel | Right | Coefi | f Contr. | Expan |
| | 050.03 3 | 355.01 | 1 | 1031.28 2 | | | | .1 | . 3 |
| Left Lev | | Station= | 16.4 | | vation= | 91.84 | | | |
| Right Le | | | 7263.55 | El∈ | vation= | 92.74 | | | |
| Blocked | | | num= | 2 | | | | | |
| | | Elev | | Sta R | Elev | | | | |
| 18.03 | 2767.32 | 03.58 | 3997.75 | 2304./9 | 78.71 | | | | |

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft)
Vel Head (ft) | 91.47
0.26 | Element
Wt. n-Val. | Left OB | Channel | Right OB
0.067 |
|---------------------------------|---------------|------------------------|-----------|----------|-------------------|
| | | | | | |
| W.S. Elev (ft) | 91.21 | Reach Len. (ft) | 1031.28 | 2400.25 | 3908.06 |
| Crit W.S. (ft) | 82.62 | Flow Area (sq ft) | 23775.96 | 8621.78 | 25287.89 |
| E.G. Slope (ft/ft) | 0.000226 | Area (sq ft) | 23775.96 | 8621.78 | 25287.89 |
| Q Total (cfs) | 125000.00 | Flow (cfs) | 28354.57 | 52279.29 | 44366.14 |
| Top Width (ft) | 5414.95 | Top Width (ft) | 3024.58 | 304.98 | 2085.39 |
| Vel Total (ft/s) | 2.17 | Avg. Vel. (ft/s) | 1.19 | 6.06 | 1.75 |
| Max Chl Dpth (ft) | 33.96 | Hydr. Depth (ft) | 7.86 | 28.27 | 12.13 |
| Conv. Total (cfs) | 8317837.0 | Conv. (cfs) | 1886790.0 | | |
| Length Wtd. (ft) | 2594.54 | Wetted Per. (ft) | 3026.25 | 313.86 | 2093.80 |
| Min Ch El (ft) | 57.25 | Shear (lb/sq ft) | 0.11 | 0.39 | 0.17 |
| Alpha | 3.58 | Stream Power (lb/ft s) | 0.13 | 2.35 | 0.30 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 20480.96 | 15134.03 | 14133.77 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 5934.98 | 817.62 | 4013.29 |

Note:

Manning's n values were composited to a single value in the main channel. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach RS: 129.3

| INPUT
Descripti | ion: Batl | nymetric | elevatio | ons trans | lated f | rom IBWC | 2008 C | ross-sect | ions |
|--------------------|----------------|--------------------|----------------|--------------------|----------------|--------------------|--------------|------------------------|----------------|
| Station E | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Ele | | Elev |
| 0
32.79 | 85.91
91.6 | 6.56
36.07 | 88.46
91.48 | 9.84
39.35 | 89.47
91.06 | 16.39
42.62 | 90.8
90.3 | | 91.17
89.42 |
| 55.74 | 86.27 | 59.02 | 84.98 | 65.58 | 82.22 | 68.85 | 81.2 | | 80.64 |
| 78.69 | 79.89 | 85.25 | 79.92 | 95.08 | 79.53 | 104.92 | 79.5 | | 79.39 |
| 127.87
183.61 | 79.26
79.16 | 134.43
190.17 | 79.29
79.08 | 147.55
200.01 | 79.23
79.14 | 154.1
213.12 | 79.3
79.1 | | 79.17
79.04 |
| 239.35 | 79.10 | 259.02 | 79.12 | 278.7 | 79.14 | 285.25 | 79.1 | | 78.98 |
| 301.65 | 79.08 | 318.04 | 79.01 | 321.32 | 78.95 | 334.44 | 78.9 | | 79.03 |
| 350.83 | 78.93 | 357.39 | 78.93 | 363.94 | 79.02 | 377.06 | 78.9 | | 79.08 |
| 396.73
465.59 | 78.95
78.96 | 413.13
475.42 | 79.01
78.92 | 422.96
491.82 | 78.93
79.09 | 429.52
501.65 | 78.9
78.9 | | 78.91
79.03 |
| 521.33 | 78.92 | 534.44 | 78.96 | 541 | 78.91 | 547.56 | 78.9 | | 78.86 |
| 567.23 | 78.98 | 573.79 | 78.9 | 586.9 | 78.92 | 593.46 | 78.9 | | 78.94 |
| 619.69
672.15 | 78.97
78.96 | 639.36
675.43 | 78.9
78.89 | 645.92
681.99 | 78.95
78.96 | 659.04
688.54 | 78.9
78.8 | | 78.87
78.88 |
| 711.5 | 78.82 | 724.61 | 78.89 | 731.17 | 78.82 | 750.84 | 78.9 | | 78.79 |
| 783.63 | 78.87 | 803.3 | 78.91 | 826.25 | 78.81 | 836.09 | 78.8 | 5 842.65 | 78.96 |
| 849.21 | 78.87 | 862.32 | 78.83 | 868.88 | 78.9 | 878.71 | 78. | | 78.77 |
| 888.55
921.34 | 78.87
78.77 | 895.11
934.45 | 78.82
78.82 | 901.67
941.01 | 78.86
78.77 | 908.22
950.85 | 78.
78.8 | | 78.85
78.74 |
| 967.24 | 78.84 | 973.8 | 78.79 | 980.36 | 78.89 | 993.47 | | 1 1000.03 | 78.72 |
| 1009.87 | 78.71 | 1019.7 | | 1026.26 | | 1049.21 | | 3 1052.49 | 78.76 |
| 1065.6 | | 1075.44 | 78.78 | 1082 | | 1098.39 | | 7 1108.23 | 78.65 |
| 1114.79
1147.57 | | 1121.34
1170.53 | | 1131.18
1180.36 | | 1134.46
1186.92 | | 8 1141.02
9 1203.31 | 78.74
78.81 |
| 1213.15 | | 1216.43 | | 1229.54 | | 1232.82 | | 7 1239.38 | 78.67 |
| 1245.94 | 78.73 | 1252.5 | 78.68 | 1262.33 | 78.77 | 1265.61 | 78.7 | 1 1272.17 | 79.01 |
| 1278.73
1318.07 | 79.22 | 1282
1321.35 | 79.23 | 1298.4
1337.74 | 79.63
79.41 | 1304.96
1344.3 | | 7 1311.51
1 1350.86 | 79.47
79.38 |
| 1360.7 | | 1363.97 | | 1370.53 | | 1380.37 | | 3 1386.93 | 79.52 |
| 1400.04 | | 1409.88 | 79.39 | 1413.16 | | 1419.71 | 79.4 | 5 1436.11 | 79.41 |
| 1445.94 | 79.48 | 1452.5 | | 1462.34 | | 1482.01 | 79.5 | | 79.43 |
| 1511.46
1560.54 | | 1518.01
1563.81 | 79.43 | 1537.64
1576.9 | | 1547.45
1586.72 | | 1 1550.73
4 1589.99 | 79.4
79.48 |
| 1603.08 | | 1609.62 | | 1622.71 | 79.59 | 1635.8 | | 9 1645.61 | 79.62 |
| 1652.15 | 79.59 | 1668.51 | | 1675.06 | 79.57 | 1684.87 | 79.6 | 6 1688.15 | 79.61 |
| 1704.5 | | 1707.78 | | 1724.14 | 79.49
79.48 | 1750.31 | | 3 1756.85 | 79.53 |
| 1769.94
1822.29 | | 1773.21
1832.11 | 79.63 | 1779.76
1838.65 | | 1786.3
1851.74 | | 2 1805.93
2 1864.83 | 79.52
79.49 |
| 1877.91 | 79.56 | 1891 | | 1900.82 | 79.65 | 1920.45 | | 1 1930.26 | 79.71 |
| 1933.54 | | 1946.62 | | 1962.98 | | 1966.25 | | 3 1976.07 | 79.59 |
| 1985.89
2044.78 | | 1998.97
2048.05 | | 2015.33 | 79.67
79.53 | 2018.6 | | 4 2025.15
6 2087.31 | 79.62
79.48 |
| 2097.13 | | 2113.49 | | 2120.03 | | 2126.58 | | 8 2129.85 | 80.13 |
| 2139.66 | | 2142.94 | | 2149.48 | | 2156.02 | 82.2 | 1 2159.3 | 82.25 |
| 2162.57 | | 2169.11 | | 2178.93 | | 2188.74 | | 9 2201.83 | 80.35 |
| 2224.73
2277.08 | | 2234.55
2280.36 | 80.55 | 2244.36
2286.9 | | 2260.72
2290.17 | | 6 2267.27
9 2296.72 | 80.2
80.07 |
| 2306.53 | 79.97 | 2309.8 | | 2322.89 | | 2329.43 | | 2 2335.98 | 82.19 |
| 2339.25 | | 2342.52 | 81.53 | 2345.79 | 80.64 | 2349.07 | 79.3 | 9 2355.61 | 77.67 |
| 2362.15 | | 2365.43 | | 2371.97 | | 2375.24 | | 3 2378.51 | 74.41 |
| 2381.78
2425.42 | 72.97
56.29 | 2391.6
2435.42 | | 2398.14
2445.42 | | 2405.42
2455.42 | | 9 2415.42
9 2465.42 | 56.79
56.19 |
| 2475.42 | | 2485.42 | | 2505.42 | | 2515.42 | | 9 2525.42 | 57.29 |
| 2535.42 | | 2545.42 | | 2565.42 | | 2575.42 | | 9 2585.42 | 59.29 |
| 2595.42
2617.51 | | 2601.13
2624.06 | 62.1 | 2604.4
2630.62 | | 2607.68
2637.17 | | 7 2614.23
9 2650.28 | 67.64
75.99 |
| 2656.83 | | 2669.94 | | 2673.22 | | 2676.49 | | 6 2679.77 | 80.38 |
| 2683.05 | 80.79 | 2689.6 | | 2699.43 | | 2702.71 | | 2 2709.26 | 80.07 |
| 2715.81 | | 2725.64 | | 2738.75 | | 2758.41 | | 4 2774.79 | 79.74 |
| 2784.62
2823.95 | 79.81 | 2794.46
2830.5 | | 2801.01
2840.33 | | 2807.56
2846.88 | | 7 2814.12
6 2856.71 | 79.98
79.59 |
| 2866.54 | | 2879.65 | | 2905.86 | | 2909.14 | | 3 2925.53 | 78.91 |
| 2928.8 | 78.96 | 2938.63 | 78.87 | 2964.85 | 78.85 | 2971.4 | 79.0 | 3 2974.68 | 79.01 |
| 2977.95 | | 2984.51 | | 2994.34 | | 3004.17 | | 3 3010.72 | 80.87 |
| 3014
3050.04 | | 3020.55
3063.15 | | 3023.83
3079.53 | | 3027.1
3092.64 | | 9 3033.66
2 3095.92 | 81.56
81.36 |
| 3105.75 | | 3118.85 | | 3141.79 | 81.19 | | | 6 3164.73 | 81.27 |
| 3174.56 | 81.27 | 3181.11 | 81.33 | 3187.66 | 81.23 | 3194.22 | 81.2 | 4 3210.6 | 81.12 |
| 3217.15
3259.75 | | 3220.43
3289.24 | | 3230.26
3292.52 | | 3246.64
3299.07 | 81.0 | 4 3253.2
5 3305.63 | 81.12
80.97 |
| 3312.18 | | 3318.73 | | 3331.84 | | 3344.95 | 80.7 | | 80.53 |
| 3367.88 | | 3374.44 | | 3380.99 | | 3387.54 | | 6 3397.37 | 79.93 |
| 3403.93 | 79.55 | 3407.21 | | 3420.31 | | 3426.87 | 80.3 | 6 3430.14 | 80.39 |
| 3436.7
3456.36 | | 3439.97
3466.19 | | 3446.53
3472.74 | 80.22
79.64 | 3449.8
3482.57 | | 7 3453.08
2 3489.12 | 80.22
79.99 |
| 3495.68 | | 3502.23 | | 3512.06 | | 3521.89 | 79.8 | | 79.92 |
| 3538.27 | 79.99 | 3548.11 | 79.77 | 3551.38 | 79.89 | 3564.49 | 79.6 | 7 3571.04 | 79.14 |
| 3577.6
3616.92 | | 3580.87
3623.47 | | 3593.98
3630.02 | | 3597.26
3636.58 | | 8 3603.81
2 3643.13 | 78.54
78.48 |
| JU10.72 | 10.31 | JU23.4/ | /0.41 | 5050.02 | /0.31 | 2020.28 | ,0.3 | 2 2073.13 | /0.48 |

```
78.53 3659.51
78.47 3698.83
78.4 3741.43
                                                              78.52 3675.9
                                                                                     78.48 3682.45
 3692.28
                                      78.51 3705.39
78.27 3747.99
                                                              78.42 3718.5
78.29 3757.82
                                                                                    78.4 3725.05
78.41 3764.37
                                                                                                           78.31
78.32
 3731.6
3770.92
               78.41 3777.48
78.39 3826.15
                                                             78.44 3793.7
78.33 3842.38
                                       78.34 3787.21
                                                                                    78.37 3800.19
                                                                                                           78.46
                                      78.54 3835.89
78.6 3868.34
  3809.93
                                                                                      78.3 3845.62
                                                                                     78.33 3878.07
  3852.11
                78.45 3858.6
                                                             78.54 3874.83
                                                                                                            78.12
               78.57 3887.81
81.66 3930
                                      78.99 3891.05
83.51 3936.49
                                                             80 3894.3
84.78 3939.73
  3884.56
                                                                                     85.74 3942.98
  3917.02
                                                                                                           86.99
               81.66 3930
89.85 3952.71
89.85 3985.16
                                      90.46 3962.45
88.87 3991.65
82.95 4020.86
                                                             90.78 3975.43
86.34 3994.9
84.36 4024.1
  3949.47
                                                                                    90.57 3978.67
85.51 4007.88
                                                                                                           90.35
               82.55 4014.37
 4011.12
                                                                                    84.88 4027.35
                                                                                                           84.84
                 84.2 4037.08
                                        82.4 4040.33
                                                             81.79 4046.82
Manning's n Values
                                     num=
                                                     6
                                    n Val
                                                     Sta
                                                            n Val
                                                                            Sta
                                                                                    n Val
               .068 2306.53
        0
                                       .068 2335.98
                                                              .066 2398.14
                                                                                      .025 2607.68
                                                                                                             .066
                  .06
Bank Sta: Left Right 2335.98 2683.05
                                     Lengths: Left Channel
                                                                                      Coeff Contr.
                                    Lengths: Left Channel Right
1060.66 1050 1065.26
32.79 Elevation= 91.6
3962.45 Elevation= 90.78
                                                                                                .1
Left Levee
Right Levee
                      Station= 32.79
Station= 3962.45
Blocked Obstructions
Sta L Sta R Elev
2.82 2152.11 82.35
                                  num=
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                         91.14
                                                      Element
                                                                                           Left OB
                                                                                                                          Right OB
                                                                                                           Channel
  Vel Head (ft)
W.S. Elev (ft)
                                                      Wt. n-Val.
Reach Len. (ft)
                                                                                                          0.044
                                           0.01
                                                                                             0.068
                                                                                                                             0.060
                                                                                          1060.66
                                                                                                                          1065.26
                                         91.14
  Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                      Flow Area (sq ft)
Area (sq ft)
                                                                                        20369.12
20369.12
                                         64.28
                                                                                                          9244.92
                                                                                                                        14643.40
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                                                                                          8570.56
347.07
                                    20000.00
                                                      Flow (cfs)
                                                                                          5958.32
                                                                                                                          5471.12
                                                                                          2297.23
                                      4011.31
                                                      Top Width (ft)
                                                      Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                              0.93
                                                                                                                              0.37
                                         0.45
                                                                                                                             10 71
                                                                                               8 87
                                                                                                             26 64
                                     6397802.0
                                                                                          1906009.0
                                                                                                           2741637.0
                                      1056.44
                                                                                          2298.99
                                                                                                           355.59
                                                                                                                          1381.20
                                                                                                            0.02
  Min Ch El (ft)
                                                      Shear (lb/sq ft)
                                                      Stream Power (lb/ft s)
Cum Volume (acre-ft)
  Alpha
                                           2.12
                                                                                              0.00
                                                                                                              0.01
                                                                                                                              0.00
   Frctn Loss (ft)
                                           0.01
                                                                                         19958.39
                                                                                                        14641.79
  C & E Loss (ft)
                                          0.00
                                                      Cum SA (acres)
                                                                                          5871.98
                                                                                                           799.65
                                                                                                                          3858.42
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 129.27

INPUT

| INPUT | | | | | | | | | |
|-----------|----------|---------|-------|---------|----------|----------|---------|-----------|-------|
| Descripti | | | | | slated f | rom IBWC | 2008 Cr | oss-sect: | ions |
| Station E | levation | n Data | num= | 459 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 90.91 | 3.26 | 90.28 | 9.78 | 88.6 | 13.04 | 87.45 | 16.3 | 86.38 |
| 19.56 | 85.23 | 26.07 | 82.77 | 29.33 | 81.82 | 32.59 | 81.11 | 35.85 | 80.54 |
| 39.11 | 80.03 | 42.37 | 79.62 | 45.63 | 79.48 | 52.15 | 79.36 | 61.92 | 78.9 |
| 78.22 | 78.88 | 88 | 78.8 | 101.03 | 78.86 | 114.07 | 78.78 | 120.59 | 78.8 |
| 123.85 | 78.75 | 130.37 | 78.8 | 136.88 | 78.72 | 146.66 | 78.73 | 153.18 | 78.68 |
| 159.7 | 78.75 | 162.96 | 78.74 | 172.74 | 78.79 | 182.51 | 78.75 | 189.03 | 78.8 |
| 195.55 | 78.78 | 205.33 | 78.7 | 211.85 | 78.82 | 218.36 | 78.73 | 221.62 | 78.79 |
| 224.88 | 78.78 | 228.14 | 78.66 | 231.4 | 78.65 | 237.92 | 78.75 | 244.44 | 78.68 |
| 254.21 | 78.73 | 267.25 | 78.57 | 270.51 | 78.6 | 273.77 | 78.57 | 277.03 | 78.64 |
| 283.55 | 78.67 | 286.81 | 78.63 | 293.32 | 78.63 | 296.58 | 78.67 | 303.1 | 78.57 |
| 306.36 | 78.61 | 312.88 | 78.59 | 316.14 | 78.54 | 329.18 | 78.58 | 335.69 | 78.64 |
| 342.21 | 78.58 | 345.47 | 78.59 | 358.51 | 78.55 | 365.03 | 78.64 | 368.29 | 78.6 |
| | | | | | | | | | |
| 374.8 | 78.62 | 378.06 | 78.66 | 384.58 | 78.54 | 387.84 | 78.64 | 391.1 | 78.55 |
| 397.62 | 78.6 | 400.88 | 78.55 | 404.14 | 78.59 | 407.4 | 78.54 | 413.91 | 78.61 |
| 417.17 | 78.56 | 423.69 | 78.6 | 426.95 | 78.51 | 433.47 | 78.59 | 436.73 | 78.53 |
| 443.25 | 78.51 | 446.51 | 78.47 | 453.02 | 78.6 | 459.54 | 78.59 | 466.06 | 78.5 |
| 472.58 | 78.58 | 479.1 | 78.5 | 485.62 | 78.54 | 492.16 | 78.48 | 498.7 | 78.45 |
| 501.97 | 78.48 | 505.25 | 78.41 | 511.79 | 78.48 | 515.06 | 78.43 | 521.61 | 78.54 |
| 524.88 | 78.43 | 528.15 | 78.4 | 531.42 | 78.47 | 541.24 | 78.47 | 547.78 | 78.35 |
| 557.6 | 78.26 | 567.41 | 78.39 | 570.68 | 78.39 | 577.23 | 78.32 | 580.5 | 78.35 |
| 587.04 | 78.25 | 590.32 | 78.25 | 593.59 | 78.31 | 596.86 | 78.25 | 603.4 | 78.22 |
| 613.22 | 78.38 | 616.49 | 78.36 | 619.76 | 78.25 | 629.58 | 78.26 | 632.85 | 78.23 |
| 642.67 | 78.24 | 649.21 | 78.23 | 652.48 | 78.26 | 659.03 | 78.27 | 662.3 | 78.31 |
| 668.84 | 78.27 | 675.39 | 78.26 | 685.2 | 78.31 | 688.47 | 78.23 | 695.02 | 78.22 |
| 698.29 | 78.19 | 704.83 | 78.27 | 711.38 | 78.3 | 721.19 | 78.17 | 731.01 | 78.15 |
| 734.28 | 78.18 | 740.82 | 78.14 | 747.37 | 78.17 | 753.91 | 78.14 | 757.18 | 78.22 |
| 760.45 | 78.22 | 767 | 78.08 | 773.54 | 78.14 | 776.81 | 78.11 | 786.63 | 78.13 |
| 789.9 | 78.1 | 796.45 | 78.16 | 799.72 | 78.1 | 809.53 | 78.12 | 812.81 | 78.18 |
| 816.08 | 78.16 | 822.62 | 78.22 | 829.16 | 78.13 | 832.44 | 78.11 | 842.25 | 78.11 |
| 848.8 | 78.15 | 855.34 | 78.12 | 858.61 | 78.15 | 861.88 | 78.1 | 881.52 | 78.05 |
| 888.06 | 77.98 | 904.42 | 78.07 | 910.96 | 78.03 | 917.51 | 77.95 | 924.05 | 77.95 |
| 933.87 | 78 | 940.41 | 77.94 | 943.68 | 78 | 946.95 | 77.96 | 953.5 | 77.96 |
| 956.77 | 78.01 | 963.31 | 78.02 | 966.58 | 77.99 | 969.86 | 78.02 | 973.13 | 77.97 |
| 976.4 | 77.98 | 982.94 | 78.07 | 989.49 | 78 | 996.03 | 78.1 | 999.3 | 77.97 |
| 1002.58 | | 1005.85 | | 1012.39 | | 1018.94 | | 1022.21 | 78.06 |
| 1025.48 | | 1028.75 | 77.88 | 1035.3 | | 1038.57 | | 1045.11 | 77.86 |
| 1051.65 | | 1054.93 | 77.88 | 1058.2 | | 1068.01 | | 1071.29 | 77.83 |
| 1074.56 | | 1077.83 | 77.78 | 1081.1 | | 1087.65 | | 1100.73 | 78.18 |
| 1107.28 | | 1117.09 | | 1123.64 | | 1126.91 | | 1130.18 | 79.34 |
| 1133.45 | 79.86 | 1140 | | 1143.27 | | 1146.54 | | 1149.81 | 82.57 |
| 1156.36 | | 1159.63 | 82.38 | 1162.9 | | 1169.44 | | 1172.71 | 80.05 |
| | | | | | | | | | |
| 1175.99 | | 1182.53 | 79.3 | 1185.8 | | 1192.35 | | 1198.89 | 78.02 |
| 1202.16 | | 1205.43 | | 1215.25 | | 1218.52 | | 1225.07 | 77.76 |
| 1228.34 | | 1234.88 | | 1241.42 | | 1247.97 | | 1251.24 | 77.45 |
| 1254.51 | | 1261.06 | 77.56 | 1267.6 | | 1270.87 | | 1277.42 | 77.42 |
| 1283.96 | | 1287.23 | | 1293.78 | | 1297.05 | | 1300.32 | 77.28 |
| 1306.86 | | 1310.14 | | 1316.68 | | 1323.22 | | 1329.77 | 77.69 |
| 1333.04 | | 1339.58 | | 1342.85 | | 1346.13 | | 1352.67 | 77.16 |
| 1375.57 | | 1378.85 | | 1382.12 | | 1385.39 | | 1388.66 | 78.16 |
| 1391.93 | 78.31 | 1395.2 | | 1398.48 | | 1401.75 | | 1408.29 | 78.32 |
| 1411.56 | | 1418.11 | | 1421.38 | | 1427.92 | | 1437.74 | 79.21 |
| 1441.01 | | 1444.28 | | 1450.83 | 79.23 | 1454.1 | | 1457.37 | 79.34 |
| 1463.91 | 79.46 | 1470.46 | 79.74 | 1473.73 | 79.91 | 1477 | 79.99 | 1480.27 | 80.01 |
| | | | | | | | | | |

```
76.03 1499.91
 1503.18
              70.31 1506.45
                                  69.01 1509.72
                                                       68.18 1512.99
62.77 1529.35
                                                                            67.61 1516.26
                                                                                                67.13
55.7
             55.41 1547.07
55.7 1609.07
                                                        55.2 1572.07
 1542.07
                                   55.3 1560.07
                                                                               55 1584.07
                                                                                                 55.3
                                                                            55.6 1631.07
 1597.07
                                      56 1621.07
                                                        55.4 1624.07
                                                                                                56 01
 1632.07
               56.1 1638.07
                                  56.24 1643.07
                                                        56.4 1651.07
                                                                           56.53 1654.07
                                                                                                 56.6
 1657.07
1693.23
              56.83 1663.07
61.85 1696.51
                                  57.37 1664.07
62.01 1699.79
                                                       57.5 1674.07
63.27 1703.07
                                                                           57.7 1683.07
64.97 1706.35
                                                                                                66.87
                                                                           73.93 1726.03
77.04 1749
77.97 1775.24
 1709.63
              68.48 1716.19
                                      71 1719.47
                                                       72.38 1722.75
                                                                                                74.72
 1755.56
              76.99 1758.84
                                  76.93 1762.12
                                                       77.04 1771.96
                                                                                                 78.3
                                                      81.33 1791.64
81.1 1811.33
80.28 1827.73
80.19 1853.98
              78.56 1781.8
81.23 1804.77
                                  78.94 1788.36
81.03 1808.05
 1778.52
 1801.49
                                                                            81.08 1814.61
                                                                                                80.82
                                                                           80.31 1831.01
80.24 1863.82
 1817.89
              80.49 1821.17
                                   80.3 1824.45
                                                                                                80 23
               80.2 1844.13
                                  80.25 1850.69
 1840.85
                                                                                                80.17
                                  80.25 1880.22
80.09 1906.47
79.97 1932.71
79.88 1952.39
79.85 1988.48
 1870.38
             80.21 1876.94
80.17 1899.9
                                                       80.13 1886.78
                                                                           80.11 1890.06
80.02 1916.31
                                                                                                80.15
                                                       80.09 1913.03
             79.98 1929.43
79.97 1949.11
                                                      80.05 1935.99
79.86 1958.95
79.87 1995.04
                                                                           80.05 1939.27
79.96 1972.08
79.86 2001.6
 1919.59
                                                                                                79.96
 1942.55
1975.36
                                                                                                79.79
              79.93 1985.2
             79.83 2014.72
79.73 2044.25
                                  79.84 2021.29
79.7 2047.53
                                                      79.78 2027.85
79.6 2054.09
                                                                            79.76 2034.41
79.66 2057.37
 2008.16
                                                                                                 79.7
 2040.97
                                                                                                79.62
                                  79.7 2047.33
79.73 2070.5
79.7 2093.46
79.74 2116.43
79.74 2142.67
                                                      79.63 2077.06
79.7 2100.02
79.74 2122.99
              79.7 2063.93
79.64 2090.18
                                                                           79.59 2083.62
79.61 2103.3
                                                                                                79.71
79.59
 2060.65
  2086.9
                                                                            79.64 2132.83
79.63 2152.51
 2109.86
              79.65 2113.14
                                                                                                79.64
                                                                           79.63 2152.51
79.62 2185.32
79.7 2227.97
79.66 2257.5
79.67 2287.02
79.69 2313.27
                                  79.66 2172.2
79.68 2208.28
79.69 2247.65
 2159.07
              79.71 2168.92
                                                       79.73 2178.76
                                                                                                 79.7
                                                      79.6 2218.13
79.71 2250.93
79.7 2280.46
 2191.88
              79.65 2195.16
                                                                                                79.63
              79.63 2241.09
79.67 2267.34
 2234.53
                                  79.7 2273.9
79.72 2303.43
 2260 78
                                                                                                79 74
 2293.58
              79.75 2300.14
                                                       79.79 2309.99
                                  79.64 2329.67
79.65 2362.48
 2319.83
               79.7 2323.11
                                                       79.68 2332.95
                                                                            79.61 2339.51
                                  79.92 2395.28
 2382.16
              79.81 2388.72
                                                       79.95 2398.56
                                                                            80.03 2401.85
                                                                                                80.03
             79.88 2411.69
80.76 2431.37
                                  79.92 2414.97
81.32 2434.65
                                                       80.02 2418.25
81.55 2437.93
                                                                           80.23 2421.53
81.9 2441.21
 2408.41
 2424.81
                                                                                                82.42
                                                       84.93 2454.34
89.84 2470.74
 2444 49
              83.11 2447.78
                                  83.93 2451.06
                                                                            85.99 2457.62
              88.36 2464.18
                                  89.36 2467.46
  2477.3
             90.62 2483.86
                                  90.72 2487.14
                                                       90.73 2490.42
                                                                            90.68
Manning's n Values
           n Val
                                 n Val Sta
.066 1156.36
                          Sta
                                                                           n Val Sta
                                                      n Val
                          3.26
                                                         .07
                                                                  1477
             .085
                                                                                                 .025
                .07 1791.64
 1709.63
                                    .066
Bank Sta: Left
                     Right
                                 Lengths: Left Channel
                                                               Right
                                                                            Coeff Contr
                                                                                                Expan.
        1480.27 1791.64
                                          704.22
                                                      1050 1152.61
Ineffective Flow
Sta L Sta R
                         num= 2
Elev Permanent
   Sta L Sta R
0 1480.27
                        80.01
 1791.64 2490.42
                        82.07
                   Station=
                                                Elevation=
Left Levee
                 Station= 2487.14
Right Levee
                                                Elevation=
                                                               90 73
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                    91.13
                                                Element
                                                                                  Left OB
                                                                                               Channel
                                                                                                             Right OB
                                                Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
Flow (cfs)
  Vel Head (ft)
                                                                                  0.067
704.22
                                                                                               0.041
                                                                                                             0.066
  W.S. Elev (ft)
  Crit W.S. (ft)
                                     63 97
                                                                               16161.90
                                                                                               8359 52
                                                                                                             6020 14
  E.G. Slope (ft/ft)
                                                                               18526.88
                                 0.000016
  O Total (cfs)
                                 20000.00
                                                                                 7111.94
                                                                                             10601.22
                                                                                                             2286.84
  Top Width (ft)
Vel Total (ft/s)
                                  2490.42
                                                 Top Width (ft)
                                                Avg. Vel. (ft/s)
                                      0.65
                                                                                    0.44
                                                                                                  1.27
                                                                                                                 0.38
                                                Hydr. Depth (ft)
  Max Chl Dpth (ft)
                                     36.11
                                                                                   10.92
                                                                                                 26.85
                                 4972895.0
                                                                                 1768348.0
                                                                                                2635938.0
  Conv. Total (cfs)
Length Wtd. (ft)
                                                 Conv. (cfs)
                                                                                                               568609.9
                                                Wetted Per. (ft)
Shear (lb/sq ft)
                                                                                                              700.60
                                   994.39
                                                                                 1483.07
                                                                                                324.03
  Min Ch El (ft)
                                                                                                  0.03
                                     55.00
                                                                                   0.01
                                                                                                                 0.01
  Alpha
                                      2.19
                                                Stream Power (lb/ft s)
                                                                                    0.00
                                                                                                  0.03
                                                                                                                 0.00
                                                Cum Volume (acre-ft)
                                                                               19484.84
                                                                                             14429.61
                                                                                                            12072.83
  C & E Loss (ft)
                                                                                                791.72
                                      0.01
                                                Cum SA (acres)
                                                                                5825.99
                                                                                                             3833.16
Warning: The cross-section end points had to be extended vertically for the computed water surface.
          The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
Warning:
           1.4. This may indicate the need for additional cross sections.
            Manning's n values were composited to a single value in the main channel.
           Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                 RS: 129.23
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
Sta Elev St
                                 num=
                                              34
                          Sta
                                               Sta
             91.64
73.84
                                                      91.64
64.82
                                                                           81.64
61.39
                                                                                                74.54
59.74
        Ω
                          3275
                                  91.64
                                              3307
                                                                  3308
                                                                                       3320
                          3332
                                  66.34
                                              3336
     3359
              56.24
                          3369
                                  55.74
                                              3379
                                                       55.44
                                                                   3389
                                                                            55.24
                                                                                       3399
                                                                                                55.14
                                  55.74
56.74
     3409
              55.64
                          3419
                                              3429
                                                       56.04
                                                                   3439
                                                                            56.14
                                                                                       3509
     3459
              56.94
                          3469
                                              3479
                                                       56.74
                                                                   3489
                                                                            56.84
                                                                                                57.44
     3519
              58 24
                          3529
                                  58.74
                                              3539
                                                       61 38
                                                                   3541
                                                                            63 54
                                                                                       3553
                                                                                                64.86
                                              3616
                                                       91.64
                                                                            91.64
Manning's n Values
                                 num=
     Sta
             n Val
                           Sta
                                  n Val
                                               Sta
                                                      n Val
                                                                    Sta
                                                                           n Val
                                                                                         Sta
                                                                                                n Val
                                              3308
                         3275
                                                                  3336
     3615
Bank Sta: Left Right
                                 Lengths: Left Channel
                                                                Right
                                                                             Coeff Contr.
                                                                                                Expan.
            3308
                      3615
                                  0
                                          57.04
                                                         70
                                                                79.73
                   Station=
                                                Elevation=
Right Levee
                   Station=
                                   7505
                                                Elevation=
                                                                 91 64
CROSS SECTION OUTPUT Profile #Design Flow
                                                 Element
  E.G. Elev (ft)
                                                                                  Left OB
                                                                                                Channel
                                                                                                             Right OB
  Vel Head (ft)
W.S. Elev (ft)
                                                Wt. n-Val.
Reach Len. (ft)
                                                                                   0.144
57.04
                                                                                                 0.040
                                                                                                               0.060
79.73
                                      0.08
```

| Crit W.S. (ft) | 63.74 | Flow Area (sq ft) | 4.40 | 9055.54 | 6.85 |
|--------------------|-----------|------------------------|----------|-----------|----------|
| E.G. Slope (ft/ft) | 0.000040 | Area (sq ft) | 4.40 | 9055.54 | 6.85 |
| Q Total (cfs) | 20000.00 | Flow (cfs) | 0.17 | 19999.17 | 0.66 |
| Top Width (ft) | 308.90 | Top Width (ft) | 0.94 | 307.00 | 0.96 |
| Vel Total (ft/s) | 2.21 | Avg. Vel. (ft/s) | 0.04 | 2.21 | 0.10 |
| Max Chl Dpth (ft) | 35.88 | Hydr. Depth (ft) | 4.69 | 29.50 | 7.14 |
| Conv. Total (cfs) | 3154816.0 | Conv. (cfs) | 27.3 | 3154685.0 | 103.7 |
| Length Wtd. (ft) | 70.00 | Wetted Per. (ft) | 9.43 | 317.51 | 14.31 |
| Min Ch El (ft) | 55.14 | Shear (lb/sq ft) | 0.00 | 0.07 | 0.00 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.00 | 0.16 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 19335.05 | 14219.72 | 11974.67 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 5814.02 | 784.27 | 3823.90 |
| | | | | | |

Manning's n values were composited to a single value in the main channel. Note:

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 129.22

Description: Original IBWC Cross-section data applied to this section

| DCDCLIPCIO | om. origi | HAT TON | C CLODD | DCCCTOIL | aaca app | IICU CO | CITED DCC | CIOII | |
|------------|-----------|---------|---------|----------|----------|---------|-----------|-------|-------|
| Station E | levation | Data | num= | 34 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| 0 | 91.64 | 3275 | 91.64 | 3307 | 91.64 | 3308 | 81.64 | 3320 | 74.54 |
| 3327 | 73.84 | 3332 | 66.34 | 3336 | 64.82 | 3345 | 61.39 | 3349 | 59.74 |
| 3359 | 56.24 | 3369 | 55.74 | 3379 | 55.44 | 3389 | 55.24 | 3399 | 55.14 |
| 3409 | 55.64 | 3419 | 55.74 | 3429 | 56.04 | 3439 | 56.14 | 3449 | 56.24 |
| 3459 | 56.94 | 3469 | 56.74 | 3479 | 56.74 | 3489 | 56.84 | 3509 | 57.44 |
| 3519 | 58.24 | 3529 | 58.74 | 3539 | 61.38 | 3541 | 63.54 | 3553 | 64.86 |
| 3571 | 66.84 | 3615 | 76.74 | 3616 | 91.64 | 7505 | 91.64 | | |
| | | | | | | | | | |
| Manning's | n Values | | num= | 6 | | | | | |
| Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val | Sta | n Val |
| 0 | .144 | 3275 | .144 | 3308 | .066 | 3336 | .025 | 3553 | .066 |
| 3615 | .06 | | | | | | | | |

| Bank Sta: Left | Right | Lengths | : Left Chanr | nel | Right | Coeff | Contr. | Expan. |
|----------------|----------|---------|--------------|-----|-------|-------|--------|--------|
| 3308 | 3615 | | 79.88 | 70 | 67.66 | | .1 | . 3 |
| Left Levee | Station= | 0 | Elevati | on= | 91.64 | | | |
| Right Levee | Station= | 7505 | Elevati | on= | 91.64 | | | |

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 91.10 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|----------|-----------|----------|
| Vel Head (ft) | 0.08 | Wt. n-Val. | 0.144 | 0.040 | 0.060 |
| W.S. Elev (ft) | 91.02 | Reach Len. (ft) | 79.88 | 70.00 | 67.66 |
| Crit W.S. (ft) | 63.74 | Flow Area (sq ft) | 4.40 | 9054.67 | 6.84 |
| E.G. Slope (ft/ft) | 0.000040 | Area (sq ft) | 4.40 | 9054.67 | 6.84 |
| Q Total (cfs) | 20000.00 | Flow (cfs) | 0.17 | 19999.17 | 0.66 |
| Top Width (ft) | 308.90 | Top Width (ft) | 0.94 | 307.00 | 0.96 |
| Vel Total (ft/s) | 2.21 | Avg. Vel. (ft/s) | 0.04 | 2.21 | 0.10 |
| Max Chl Dpth (ft) | 35.88 | Hydr. Depth (ft) | 4.69 | 29.49 | 7.14 |
| Conv. Total (cfs) | 3154310.0 | Conv. (cfs) | 27.3 | 3154179.0 | 103.6 |
| Length Wtd. (ft) | 70.03 | Wetted Per. (ft) | 9.43 | 317.51 | 14.31 |
| Min Ch El (ft) | 55.14 | Shear (lb/sq ft) | 0.00 | 0.07 | 0.00 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 0.00 | 0.16 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 19335.04 | 14205.17 | 11974.66 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 5814.01 | 783.77 | 3823.90 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross

sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 129.216

INPUT

Description: Original IBWC Cross-section data applied to this section Station Elevation Data $$\rm num=$14$$

| ation | Elevation | Data | num= | 14 | | | | | |
|-------|-----------|------|-------|-----|-------|-----|-------|-----|-------|
| Sta | a Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
| (| 91.64 | 100 | 91.64 | 100 | 55.64 | 140 | 55.64 | 140 | 91.64 |
| 145 | 91.64 | 145 | 55.64 | 227 | 55.64 | 227 | 91.64 | 232 | 91.64 |
| 227 |) EE 61 | 272 | EE 61 | 272 | 01 64 | 272 | 01 64 | | |

Manning's n Values Sta n Val 0 .015 .015

| Bank Sta: Left | Right | Lengths | : Left C | hannel | Right | Coeff Contr. | Expan. |
|-----------------|----------|---------|----------|---------|-------|--------------|--------|
| 145 | 227 | | 15.43 | 20 | 21.58 | .2 | .5 |
| Left Levee | Station= | 0 | Ele | vation= | 91.64 | | |
| Right Levee | Station= | 372 | Ele | vation= | 91.64 | | |
| Blocked Obstruc | tions | num= | 2 | | | | |
| Sta L Sta | R Elev | Sta L | Sta R | Elev | | | |
| 100 14 | 0 87.64 | 232 | 272 | 87.64 | | | |

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) Vel Head (ft) W.S. Elev (ft) Crit W.S. (ft) E.G. Slope (ft/ft) Q Total (cfs) | 91.03
0.73
90.30
67.92
0.000097
20000.00 | Element Wt. n-Val. Reach Len. (ft) Flow Area (sq ft) Area (sq ft) Flow (cfs) | Left OB
0.015
15.43
106.31
106.31
183.52 | Channel
0.015
20.00
2841.93
2841.93
19632.97 | Right OB
0.015
21.58
106.31
106.31
183.52 | |
|---|--|---|---|---|--|--|
| Top Width (ft) Vel Total (ft/s) Max Chl Dpth (ft) Conv. Total (cfs) Length Wtd. (ft) Min Ch El (ft) Alpha | 162.00
6.55
34.66
2026357.0
20.00
55.64
1.09 | Top Width (ft) Avg. Vel. (ft/s) Hydr. Depth (ft) Conv. (cfs) Wetted Per. (ft) Shear (lb/sq ft) Stream Power (lb/ft s) | 40.00
1.73
2.66
18593.4
45.32
0.01
0.02 | 82.00
6.91
34.66
1989170.0
151.32
0.11
0.79 | 40.00
1.73
2.66
18593.4
45.32
0.01 | |

```
Frctn Loss (ft)
                                              Cum Volume (acre-ft)
                                                                                      14195.61
  C & E Loss (ft)
                                              Cum SA (acres)
                                                                            5813.98
                                                                                          783.46
                                                                                                      3823.87
        Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
INLINE STRUCTURE
RIVER: Rio Grande
                               RS: 129.215
REACH: Lower Reach
INPUT
Description: Retamal Dam
Distance from Upstream XS =
Deck/Roadway Width =
Weir Coefficient =
Weir Embankment Coordinates
                                      num =
      Sta Elev
0 91.64
                      Sta Elev
372 91.64
Upstream Embankment side slope
                                                              0 horiz. to 1.0 vertical
Downstream Embankment side slope = Maximum allowable submergence for weir flow =
                                                              0 horiz. to 1.0 vertical
Elevation at which weir flow begins
Weir crest shape
INLINE STRUCTURE GATE Gate #1
       . 6
                                             Radial Coefficient=
       Head Exponent
        Trunion Height
       Weir Coefficient = 3.
Weir crest shape = Ogee
                                  3 58
Number of Gate Openings =
      186
CROSS SECTION
RIVER: Rio Grande
                               RS: 129.214
REACH: Lower Reach
INPUT
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
                               num=
     Sta Elev
0 91.64
                                                     Elev
                                 Elev
                                            Sta
                                                                        Elev
                                                                                           Elev
                               91.64
55.64
                                                    55.64
55.64
                                                                       55.64
91.64
      145
             91.64
                         145
                                                                227
                                                                                          91.64
                                55.64
Manning's n Values
                               num=
      Sta n Val
0 .015
Bank Sta: Left Right Lengths: Left Channel Right 145 227 25.03 25.01 25.62 Left Levee Station= 0 Elevation= 91.64 Right Levee Station= 372 Elevation= 91.64 Blocked Obstructions num= 2 Sta L Sta R Elev
                                                                       Coeff Contr. Expan.
                                                            25.62
91.64
      ta L Sta R Elev Sta L Sta R
100 140 87.64 232 272
CROSS SECTION OUTPUT Profile #Design Flow
  E.G. Elev (ft)
                                  84.40
                                             Element
                                                                            Left OB
                                                                                         Channel
                                                                                                      Right OB
                                              Wt. n-Val.
   Vel Head (ft)
                                    1.22
                                                                                           0.015
  W.S. Elev (ft)
Crit W.S. (ft)
                                  83.18
67.92
                                             Reach Len. (ft)
Flow Area (sq ft)
                                                                                         25.01
2257.98
                                                                                                         25 62
                           0.000191
  E.G. Slope (ft/ft)
Q Total (cfs)
                                             Area (sq ft)
Flow (cfs)
                                                                                         2257 98
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                             Top Width (ft)
                                  82.00
                                                                                           82.00
                                   8.86
27.54
                                             Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                                                                           8.86
27.54
  Conv. Total (cfs)
Length Wtd. (ft)
Min Ch El (ft)
                                             Conv. (cfs)
Wetted Per. (ft)
                                                                                         1448121.0
                               1448121.0
                                   25.01
                                                                                          137.07
                                              Shear (lb/sq ft)
Stream Power (lb/ft s)
                                   55 64
                                                                                            0 20
  Alpha
  Frctn Loss (ft)
                                                                          19334.94
                                                                                        14194.76
                                                                                                     11974.57
                                    0.01
                                              Cum Volume (acre-ft)
                                    0.23
                                             Cum SA (acres)
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross
           sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
          1.4. This may indicate the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                               RS: 129.213
INPUT
Description: Original IBWC Cross-section data applied to this section
Station Elevation Data
                               num=
                      Sta
                                           Sta
      Sta
0
             Elev
                                Elev
                                                     Elev
                                                                                           Elev
                                                                       55.64
      145
             91.64
                         145
                                55.64
                                          160.5
201.5
                                                    55.64
                                                             160.5
                                                                       91.64
                                                                                170.5
211.5
                                                                                          91 64
                                55.64
91.64
    170.5
             55.64
                                                             211.5
                       227
             55.64
                                            232
                                                    91.64
                                                                       55.64
                                                                                          55.64
      272 91.64
                         372
                                91.64
```

Manning's n Values

Sta n Val

num=

1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 25.03 145 Left Levee 3 25.01 Elevation= 227 Station= 227 25.62 91 64 372 Right Levee Station= Elevation= | Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R | Elev | Sta L | Sta R | Sta R | Elev | Sta L | Sta CROSS SECTION OUTPUT Profile #Design Flow 84.16 E.G. Elev (ft) Left OB Element Channel Right OB 2.36 Wt. n-Val. Vel Head (ft) 0.015 W.S. Elev (ft) Crit W.S. (ft) Reach Len. (ft) 25.01 25.62 70.42 Flow Area (sq ft) Area (sq ft) 1621.44 E.G. Slope (ft/ft) 0.001074 0.001074 20000.00 Q Total (cfs)
Top Width (ft)
Vel Total (ft/s) Flow (cfs) Top Width (ft) 20000.00 12.33 Avg. Vel. (ft/s) 12.33 Max Chl Dpth (ft) Conv. Total (cfs) Length Wtd. (ft) Min Ch El (ft) 26.15 Hydr. Depth (ft) Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft) 610318.9 610318.9 25.01 55.64 Alpha 1.00 6.12 Frctn Loss (ft) 19334.94 C & E Loss (ft) 0.00 Cum SA (acres) 5813.97 783.38 3823.86 Warning: Divided flow computed for this cross-section. Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note: RIVER: Rio Grande REACH: Lower Reach RS: 129.212 Description: Original IBWC Cross-section data applied to this section Station Elevation Data num= Sta Elev Sta Ele 2.2 Elev 91.64 91.64 55.64 140 91.64 0 100 100 140 55.64 91.64 55.64 55.64 55.64 160.5 201.5 55.64 91.64 160.5 211.5 91.64 91.64 170.5 211.5 145 145 91.64 170.5 201.5 227 372 55.64 91.64 232 91.64 232 55.64 272 55.64 Manning's n Values num= 1 Sta n Val 0 .015 .015
 Bank Sta: Left
 Right
 Lengths: Left Channel
 Right

 145
 227
 10.01
 10.01
 10.25

 Left Levee
 Station=
 0
 Elevation=
 91.64

 Right Levee
 Station=
 372
 Elevation=
 91.64
 Coeff Contr. Expan. 91.64 Right Levee Station= 372
Blocked Obstructions num=
Sta L Sta R Elev Sta L
100 140 87.64 232 Sta R 272 87.64 CROSS SECTION OUTPUT Profile #Design Flow E.G. Elev (ft) Vel Head (ft) 84.13 Left OB Channel Right OB Wt. n-Val. 2.37 0.015 Reach Len. (ft) Flow Area (sq ft) W.S. Elev (ft) Crit W.S. (ft) 81.76 10.01 70.42 1619.31 E.G. Slope (ft/ft) Q Total (cfs) Area (sq ft) Flow (cfs) 0.001077 1619 31 20000.00 Q Total (cfs) Top Width (ft) Vel Total (ft/s) Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft) 62.00 62.00 12.35 Max Chl Doth (ft) 26.12 26.12 609365.4 Conv. Total (cfs) 609365.4 Conv. (cfs) Wetted Per. (ft) Length Wtd. (ft) 10.01 218.71 Shear (lb/sq ft) Stream Power (lb/ft s) Min Ch El (ft) 55.64 0.50 Alpha 1.00 19334.94 Freth Loss (ft) 0 00 Cum Volume (acre-ft) 14192 71 11974 57 C & E Loss (ft) Cum SA (acres) Warning: Divided flow computed for this cross-section. Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections. Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional areas agents. the need for additional cross sections.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note: RIVER: Rio Grande RS: 129.211 Description: Original IBWC Cross-section data applied to this section Station Elevation Data num= Sta Elev Sta Elev Elev Sta Elev 28 87.14 100 55.64 272 55.64 1 Manning's n Values num= Sta n Val 28 .015 Bank Sta: Left Right Lengths: Left Channel Right
28 344 112.99 100 95.7
Left Levee Station= 28 Elevation= 87.1 Expan. Coeff Contr. 112.99 28 28 Left Levee Left Levee Station= Right Levee Station= 344 Elevation=

E.G. Elev (ft) 83.02 Element Left OB Channel Right OB

CROSS SECTION OUTPUT Profile #Design Flow

| Vel Head (ft) | 0.15 | Wt. n-Val. | | 0.015 | |
|--------------------|-----------|------------------------|----------|-----------|----------|
| W.S. Elev (ft) | 82.87 | Reach Len. (ft) | 112.99 | 100.00 | 95.70 |
| Crit W.S. (ft) | 62.88 | Flow Area (sq ft) | | 6377.17 | |
| E.G. Slope (ft/ft) | 0.000018 | Area (sq ft) | | 6377.17 | |
| Q Total (cfs) | 20000.00 | Flow (cfs) | | 20000.00 | |
| Top Width (ft) | 296.46 | Top Width (ft) | | 296.46 | |
| Vel Total (ft/s) | 3.14 | Avg. Vel. (ft/s) | | 3.14 | |
| Max Chl Dpth (ft) | 27.23 | Hydr. Depth (ft) | | 21.51 | |
| Conv. Total (cfs) | 4764930.0 | Conv. (cfs) | | 4764930.0 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 307.85 | |
| Min Ch El (ft) | 55.64 | Shear (lb/sq ft) | | 0.02 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.07 | |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 19334.94 | 14191.80 | 11974.57 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 5813.97 | 783.30 | 3823.86 |

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 129.21

Description: Original IBWC Cross-section data applied to this section

 Station Elevation Data
 num=
 4

 Sta
 Elev
 Sta
 Elev
 Sta
 Elev

 14
 87.14
 86
 55.64
 286
 55.64
 Sta Elev 358 87.14

num= Manning's n Values

Sta n Val 14 .015

 Bank Sta: Left
 Right
 Lengths: Left Channel
 Right

 14
 358
 472.44
 400
 409.67

 Left Levee
 Station=
 14
 Elevation=
 87.14

 Right Levee
 Station=
 358
 Elevation=
 87.14
 Coeff Contr. Expan.

CROSS SECTION OUTPUT Profile #Design Flow

| E.G. Elev (ft) | 83.00 | Element | Left OB | Channel | Right OB |
|--------------------|-----------|------------------------|----------|-----------|----------|
| Vel Head (ft) | 0.12 | Wt. n-Val. | | 0.015 | |
| W.S. Elev (ft) | 82.88 | Reach Len. (ft) | 472.44 | 400.00 | 409.67 |
| Crit W.S. (ft) | 62.24 | Flow Area (sq ft) | | 7144.03 | |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | | 7144.03 | |
| Q Total (cfs) | 20000.00 | Flow (cfs) | | 20000.00 | |
| Top Width (ft) | 324.53 | Top Width (ft) | | 324.53 | |
| Vel Total (ft/s) | 2.80 | Avg. Vel. (ft/s) | | 2.80 | |
| Max Chl Dpth (ft) | 27.24 | Hydr. Depth (ft) | | 22.01 | |
| Conv. Total (cfs) | 5432308.0 | Conv. (cfs) | | 5432308.0 | |
| Length Wtd. (ft) | 408.14 | Wetted Per. (ft) | | 335.92 | |
| Min Ch El (ft) | 55.64 | Shear (lb/sq ft) | | 0.02 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 0.05 | |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 19334.94 | 14176.28 | 11974.57 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 5813.97 | 782.59 | 3823.86 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

REACH: Lower Reach RS: 129.2

| INPUT | | | | | | | | | |
|-----------|-------|---------|----------|---------|---------|----------|---------|-----------|-------|
| Descripti | | | elevatio | | lated f | rom IBWC | 2008 Cr | oss-sect: | lons |
| Station E | | | num= | 460 | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | | Elev | | Elev |
| 0 | 82.75 | 13.06 | 84.01 | | 89.48 | | 90.03 | | 89.08 |
| 58.78 | 83.98 | 62.05 | 82.1 | 78.37 | 81.94 | | | | 80.94 |
| 143.97 | 81.42 | 150.53 | 80.55 | | 81.2 | | 81.05 | | 81 |
| 225.97 | 80.8 | 235.81 | 81.43 | 252.21 | 81.18 | | 81.21 | | 81.66 |
| 334.21 | 82.38 | 350.61 | 82.65 | | 81.73 | | | | 81.81 |
| 426.05 | 82.31 | | 82.02 | | 82.23 | | | | 82.12 |
| 586.76 | 81.94 | 599.88 | 82.07 | | 82.09 | | | | 82.2 |
| 826.19 | 81.96 | 852.43 | 81.73 | 868.83 | 81.99 | 924.59 | 82.05 | 954.11 | 81.84 |
| 970.51 | 82.08 | 996.75 | 81.59 | 1006.59 | 81.96 | 1065.63 | 81.86 | 1088.59 | 82.01 |
| 1098.43 | 81.69 | 1114.83 | 81.99 | 1137.79 | 81.7 | 1150.91 | 82.02 | 1209.94 | 81.78 |
| 1232.9 | 81.98 | 1272.26 | 81.93 | 1278.82 | 81.66 | 1295.22 | | 1324.74 | 81.83 |
| 1357.54 | 82.07 | 1367.38 | 81.87 | 1403.46 | 81.98 | 1423.14 | 81.73 | 1442.82 | 82.01 |
| 1449.38 | 81.22 | 1459.22 | 81.72 | 1475.62 | 81.85 | 1485.46 | 81.33 | 1495.3 | 77.37 |
| 1501.86 | 75.81 | 1514.98 | 75.77 | 1521.54 | 78.16 | 1528.09 | 79.39 | 1541.21 | 79.15 |
| 1567.45 | 77.67 | 1590.41 | 78.16 | 1626.49 | 78.03 | 1682.25 | 78.22 | 1711.77 | 78.04 |
| 1744.57 | 78.13 | 1810.17 | 78.08 | 1856.08 | 78.2 | 1875.76 | 78.05 | 1928.24 | 78.26 |
| 1938.08 | 78.18 | 2003.68 | 78.43 | 2059.44 | 78.23 | 2072.56 | 78.47 | 2111.92 | 78.51 |
| 2151.28 | 78.36 | 2157.84 | 78.65 | 2210.32 | 78.8 | 2223.43 | 79.02 | 2243.11 | 80.05 |
| 2252.95 | 80.94 | 2275.91 | 80.7 | 2289.03 | 81.17 | 2308.71 | 81.29 | 2351.35 | 81.15 |
| 2367.75 | 81.36 | 2436.63 | 81.22 | 2443.19 | 81.48 | 2472.71 | 81.22 | 2538.31 | 81.43 |
| 2557.99 | 81.23 | 2590.79 | 81.46 | 2623.59 | 81.29 | 2672.78 | 81.41 | 2735.1 | 81.32 |
| 2754.78 | 81.49 | 2781.02 | 81.3 | 2833.5 | 81.26 | 2876.14 | 81.59 | 2899.1 | 81.17 |
| 2912.22 | 80.36 | 2935.18 | 77.75 | 2945.02 | 78.24 | 2964.7 | 77.89 | 2981.1 | 78.3 |
| 3013.9 | 78.37 | 3043.42 | 78.22 | 3168.05 | | 3213.97 | | 3266.45 | 78.27 |
| 3279.57 | 78.48 | 3332.05 | 78.45 | 3341.89 | 78.29 | 3417.33 | 78.45 | 3450.13 | 78.25 |
| 3473.08 | 78.39 | 3502.6 | 78.3 | 3525.56 | 78.46 | 3597.72 | 78.28 | 3722.36 | 78.74 |
| 3725.64 | | 3742.04 | | 3794.52 | 79.18 | 3810.92 | 79.18 | 3830.6 | 78.67 |
| 3850.28 | 78.86 | 3896.19 | 78.52 | 3984.75 | 78.73 | 4033.95 | 78.61 | 4073.31 | 78.64 |
| 4079.87 | 78.83 | 4155.31 | 78.6 | 4188.11 | 78.85 | 4240.59 | 78.64 | 4286.51 | 78.87 |
| 4312.75 | 78.73 | 4358.67 | 78.88 | 4371.79 | 78.67 | 4414.43 | 78.76 | 4434.11 | 78.56 |
| 4473.47 | 79 | 4506.27 | 78.71 | 4555.47 | 78.93 | 4578.43 | 78.78 | 4607.94 | 79.02 |
| 4627.62 | 79.45 | 4647.3 | 78.79 | 4670.26 | 78.69 | 4693.22 | 78.86 | 4719.46 | 78.7 |
| 4729.3 | 78.88 | 4758.82 | 78.47 | 4781.78 | 78.71 | 4808.02 | 78.59 | 4827.7 | 78.95 |
| 4863.78 | 78.61 | 4886.74 | 78.94 | 4922.82 | 78.71 | 4935.94 | 78.96 | 4972.02 | 78.91 |
| 5011.38 | 78.48 | 5037.62 | 78.64 | 5050.74 | 79.05 | 5083.54 | 78.17 | 5119.62 | 78.15 |
| 5145.86 | 78.71 | 5155.7 | 78.34 | 5168.82 | 76.43 | 5172.1 | 77.3 | 5185.22 | 78.24 |
| 5198.34 | 78.39 | 5211.46 | 77.74 | 5221.3 | 78.09 | 5244.26 | 77.56 | 5267.22 | 78.05 |
| 5293.46 | 78.11 | 5316.42 | 77.82 | 5362.34 | 78.01 | 5372.18 | 77.83 | 5398.42 | 78.38 |
| 5404.98 | 78.03 | 5431.22 | 78.03 | 5447.62 | 78.27 | 5467.3 | 78 | 5506.66 | 78.24 |
| 5526.34 | 78.2 | 5536.18 | 78.57 | 5559.14 | 78.08 | 5585.38 | 78.55 | 5598.5 | 78.13 |

```
78.34 5654.25
                                                                                   78.38 5703.45
                                                            78.36 5687.05
 5778.89
5857.61
               78.25 5792.01
78.39 5870.73
                                     78.63 5811.69
78.79 5887.13
                                                            78.38 5837.93
                                                                                   78.5 5844.49
78.9 5939.61
                                                                                                         78.88
 5965.85
                78.8 5992.09
                                      78.23 6015.05
                                                            78.53 6051.13
                                                                                   78.61 6077.37
                                                                                                         78.43
 6093.77
               78.82 6106.89
                                      78.37 6169.21
                                                            78.71 6182.33
                                                                                   78.58 6270.89
 6290.57
               78.52 6306.97
                                      78.72 6320.09
                                                            78.51 6359.45
                                                                                   78.87 6375.85
                                                                                                          78.5
               78.95 6421.77
79.34 6500.49
                                      79.08 6434.89
79.16 6513.61
                                                            78.75 6451.29
78.72 6552.97
                                                                                   79.26 6470.97
79.17 6575.93
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                                                                                                         78.87
                                                                                  80.47 6667.76
80.33 6753.04
 6592.33
               79.66 6605.45
                                     79.47 6621.85
80.17 6723.52
                                                            80.26 6654.64
                                                                                                          80.3
                80.5 6697.28
 6815.36
               80.13 6903.92
                                      79.89 6930.16
                                                            80.33 6943.28
                                                                                   79.94 6959.68
                                                                                                         80.14
               79.86 6999.04
79.76 7143.36
80.07 7264.72
                                     80.38 7005.6
79.95 7182.72
                                                            79.9 7028.56
79.75 7218.8
                                                                                  80.07 7044.96
80.13 7231.92
 7107.28
                                                            80.01 7320.48
79.79 7438.56
                                     79.83 7300.8
79.92 7392.64
                                                                                  79.82 7340.16
79.84 7448.4
  7251 6
                                                                                                         79 97
                        7366.4
  7343.44
               79.69
                                                                                                         80.19
               79.77 7527.12
79.53 7681.27
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                                      79.66 7553.36
                                                            79.24 7589.44
79.77 7815.75
                                                                                    79.6 7628.79
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                                                            81.27 7946.95
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                                                                                   79.11 7963.35
                                     80.29 8012.54
65.74 8117.42
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66.71 8127.25
                                                                                  72.43 8048.59
67.32 8137.08
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                66.1 8081.37
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                                     73.16 8160.02
80.42 8219.02
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79.38 8196.08
                                                            76.12 8166.58
80.58 8232.13
                                                                                  76.86 8176.41
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 8143 64
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                                                                                                          76.45
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55.04 8313.63
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55.24 8363.63
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61.71 8536.79
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80.41 8782.28
                                                                                  81.95 8720.09
81.97 8792.1
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                                                                                                         85.16
 8798 65
               86.41 8808.46
                                     85.43 8815.01
                                                            85 59 8824 83
                                                                                  87.01 8834.65
                                                                                  80.24 8926.3
79.88 9135.79
               80.79 8844.47
                                     81.89 8854.29
                                                            80.45 8864.11
                                                                                            8926.3
                                                                                                         80.09
               80.13 9027.77
80.07 9171.85
                                     79.97 9080.14
79.8 9221.03
 9014.68
                                                            80.03 9086.69
                                                                                                         79.89
                                     80.33 9391.5
80.09 9519.36
84.2 9558.7
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               80.09
                          9362
                                                            80.13 9407.89
                                                                                  80.25 9463.62
                                                                                                         80.12
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81 9555.42
                                                            80.24 9529.19
84.58 9568.53
                                                                                  79.84 9539.03
83.09 9575.09
 9473.46
 9545.58
                                                                                                         84.62
                                     79.59 9598.04
79.27 9811.13
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               84.08 9588.2
79.54 9758.67
                                                                                  79.86 9673.44
79.01 9857.02
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79.27 9827.52
 9578 37
                                                                                                         79 48
 9706.22
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                                                            78.71 9938.98
                                                                                                         78.43
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10188.13
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80.5710801.18
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                                                                                                         80 39
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                                     80.5711210.97
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11161.79
                                                             80.511256.87
                                                                                   81.0311299.48
                                                                                                         80.86
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81.2611666.66
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                                                           81.5311469.96
                                                                                  81.31 11538.8
11384.72
                                                                                                         81.32
11574 86
               81.1711617.48
                                                             81.211715.83
                                                                                   80.5311725.67
                                                           77.8811791.23
                                                                                  77.9911817.46
11742.06
                                     80.0811784.67
               80.1211755.17
Manning's n Values
                                   n Val
                           Sta
            n Val Sta
.168 8219.02
                                                   Sta n Val
                                                                                  n Val
                                                                                                Sta
                                                                                                         n Val
                                                           .025 8458.63
                                     .066 8275.63
                                                                                   .066 8579.34
                                   Lengths: Left Channel Right
1099.85 1148.64 1145.18
52.25 Elevation= 90.0
8824.83 Elevation= 87.0
                       Right
                                                                                    Coeff Contr.
Bank Sta: Left
                                                                                                         Expan
         8219.02 8579.34
Left Levee
                     Station= 52.25
Station= 8824.83
                                                                    90.03
87.01
Right Levee
Blocked Obstructions
                                 num=
Sta L Sta R Elev
8018.03 8193.8 80.29
                           Elev
CROSS SECTION OUTPUT Profile #Design Flow
                                                     Element
                                                    Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
  Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                         0.05
                                                                                           0.168
                                                                                                          0.048
                                                                                                                          0.067
                                                                                        1099.85
                                                                                                        1148.64
                                        63.09
                                                                                       26991.19
                                                                                                        7785.52
                              0.000072
20000.00
                                                                                       26991.19
  E.G. Slope (ft/ft)
                                                     Area (sq ft)
                                                                                                        7785.52
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                                                                                      15450.64
                                                     Flow (cfs)
                                                                                        4484.48
                                                                                                                          64.87
                                                    Flow (cfs)
Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                     8700.72
                                                                                        8158.37
                                                                                                        360.32
                                                                                         0.17
                                         0.57
                                                                                                           1.98
                                                                                                                           0.24
  Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                        27 87
                                                                                            3 31
                                                                                                          21 61
                                                                                                                           1 47
                                    2362743.0
                                                                                                                        182.64
                                     1143.07
                                                                                        8164.62
                                                                                                         372.41
                                                     Shear (lb/sq ft)
Stream Power (lb/ft s)
                                                                                            0.01
  Min Ch El (ft)
                                        55.04
                                                                                                            0.09
                                         9.36
                                                                                                            0.19
  Alpha
                                                                                                                           0.00
                                                    Cum Volume (acre-ft)
Cum SA (acres)
                                                                                                      14107.73
  Frctn Loss (ft)
                                         0 15
                                                                                     19188.57
  C & E Loss (ft)
                                         0.01
                                                                                        5769.73
                                                                                                         779.45
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
            Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RTVER: Rio Grande
                                    RS: 129.03
REACH: Lower Reach
Description: Bathymetric elevations translated from IBWC 2008 Cross-sections
Station Elevation Data
                                   num=
                                                460
                          Sta
13.12
                                       Elev
                                                Sta
26.24
      Sta
                                                                                  89.57 52.49
81.76 98.42
81.07 226.36
                                                                       32.81
               82.83
                                     84.14
                                                            88.13
               89.25
80.95
                        62.33
124.66
                                     82.97
81.19
                                              65.61
160.75
                                                            82.22
81.03
                                                                    82.02
213.24
                                                                                                         80.01
  111.54
                        242.76
373.99
                                                                    282.13
429.76
  232.92
               82.03
                                     81.13
                                              249.33
                                                            81.75
                                                                                   82.52
                                                                                            308.38
                                                                                                          81.8
                                       81.8
               81.79
81.75
81.7
  475 69
                         511 77
                                     81.64 560.98
                                                            81 65 580 67
                                                                                  81 85
                                                                                            590 51
                                                                                                         81 67
```

81.86 1039.95

81.66 1174.46 81.9 1246.63

76.07 1279.44

971.06

81.86 1154.77 81.19 1236.79

76.52 1272.88

954.66

1102.29

1220.39

1263.03

81.53 1072.76

81.87 1187.58

76.45 1286 77.93 1499.24

81.8 1253.19

81.79 1092.44

81.51 1217.11 80.67 1259.75

78.66 1312.24

81.45 77.35

```
78.09 1682.95
79.97 1856.82
81.32 1951.96
                                                                78.23 1673.11
 1745.28
                78.15 1787.93
                                        78.42
                                                 1827.3
                                                                78.99 1846.98
                                                                                                               81.08
81.56
 2020.86
                81.36 2043.82
                                        81.42 2109.43
                                                                81.35 2155.36
                                                                                        81.48 2168.48
                                                                                                               81.28
                81.31 2234.09
81.18 2355.47
                                                                81.31 2289.86
81.5 2430.93
 2224.25
                                                 2283.3
                                                                                        81.53 2316.11
 2345.63
                                       81.36
                                                  2401.4
                                                                                        81.13 2444.05
                                                                                                               79.66
                78.87 2463.73
78.02 2571.99
                                                                78.29 2476.86
78.16 2650.73
                                                                                       77.89 2483.42
78.34 2690.09
                                       78.24 2621.2
78.31 2857.4
78.55 3031.27
 2493.26
                                                                                                                78.36
  2755.7
                78.15 2814.75
                                                               78.23 2890.21
                                                                                         78.4 2932.85
                                                                                                               78.19
                78.24 3018.15
                                                                75.71 3198.58
                                                                                       75.54 3267.47
76.93 3438.06
 3100.16
                77.29 3116.57
                                        76.45 3159.21
                75.51 3365.89
77.63 3470.87
                                                                75.53 3428.22
 3454.46
                                        78.18 3490.55
                                                                78.26 3503.67
                                                                                        78.69 3539.76
                                                                                                                 78.2
                77.88 3595.53
                                       78.03 3628.34
77.91 3861.26
 3585.69
                                                                77.89 3644.74
                                                                                        78.08 3710.35
                                                                                                               77.82
 3789.08
                                                                78.08 3946.55
                                                                                        77.98 3966.23
                78.12 3844.85
                                                                                                                78.07
                                       77.91 3861.26
77.86 4074.49
78.1 4271.33
77.82 4464.89
77.75 4573.15
78.05 4743.74
 4035.13
                78.04 4041.69
                                                                78.09
                                                                          4090.9
                                                                                        77.91 4120.42
                                                                                                               78.14
77.9
                77.92 4254.93
78.09 4438.64
                                                                77.89 4297.58
                                                                78.06 4494.42
77.95 4615.8
77.77 4756.87
                                                                                       77.81 4504.26
77.79 4655.17
78.07 4773.27
 4376.31
                                                                                                               78.06
                77.79 4563.31
77.73 4733.9
 4537.06
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77.94
 4691.25
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4888.09
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77.49 4963.55
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77.53 4999.63
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77.43 5078.37
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77.69 5193.19

77.98 5304.73

77.94 5531.1

78.56 5695.13

78.79 5816.51
 5098.05
5258.81
                77.66 5137.42
77.75 5281.77
                                                               77.92 5219.44
77.87 5347.38
                                                                                        77.7 5245.68
78.1 5363.79
                                                                                                               77.93
                                                               78.04 5577.03
78.2 5701.69
 5426.12
                78.08 5442.52
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                                                                                                               78.11
                                                                78.83 5823.08
 5767.31
                79.12 5790.27
                                                                                        78.63 5865.72
                                                                                                               78.86
 5878.85
5960.86
                78.74 5905.09
79.28 5987.11
                                        79 28 5911 65
                                                                78.91 5931.34
79.22 6029.76
                                                                                       79.17 5944.46
79.01 6039.6
                                        78.84 5996.95
 6059.28
                79.31 6078.97
                                        78.94 6088.81
                                                                79 14 6121 61
                                                                                        78.98 6134.74
                                                                                                               79 55
                79.01 6190.51
80.77 6282.37
                                                                                        80.27 6233.16
 6144.58
                                       79.42 6213.47
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                                                                                                               81.19
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Manning's n Values
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             n Val
                                     n Val
                                                                                       n Val
                              Sta
                                                      Sta
                                                              n Val
                 .14 7531.77
                                        .066 7662.72
                                                               .025 7832.97
                                                                                        .066 8026.13
                                     Lengths: Left Channel Right
3555.05 2827 2507.63
52.49 Elevation= 90
Bank Sta: Left Right 7567.78 7996.66
                                                                                        Coeff Contr.
Left Levee
Right Levee
                      Station= 52.49
Station=11958.91
                                                       Elevation=
Elevation=
                            1958.
s num=
Elev °
                                                     4
Blocked Obstructions
    Sta L Sta R
33.8 6226.78
                          Elev Sta L Sta R Elev Sta L Sta R
84.96 6226.78 7564.12 82.15 8004.51 8619.72
CROSS SECTION OUTPUT Profile #Design Flow
                                           82.79
  E.G. Elev (ft.)
                                                        Element
                                                                                              Left OB
                                                                                                               Channel
                                                                                                                              Right OB
   Vel Head (ft)
                                                        Wt. n-Val.
                                                                                                                0.052
                                                                                                                                 0.066
                                            0.15
                                                        Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
  W.S. Elev (ft)
Crit W.S. (ft)
                                           82.64
                                                                                             3555.05
                                                                                                              2827.00
                                                                                                                              2507.63
                                                                                              662.79
662.79
  E.G. Slope (ft/ft)
                                      0.000324
                                                                                                              6435.62
  Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                      20000.00
                                                        Flow (cfs)
Top Width (ft)
                                                                                                            19917.58
                                                                                                              428.28
                                                        Avg. Vel. (ft/s)
Hydr. Depth (ft)
                                           2.82
                                                                                                 0.12
                                                                                                                 3.09
   Max Chl Dpth (ft)
  Conv. Total (cfs)
Length Wtd. (ft)
                                      1111859 0
                                                        Conv. (cfs)
Wetted Per. (ft)
                                                                                                4532 7
                                                                                                             1107277 0
                                                                                                                                     49 4
                                                                                                              437.20
                                                        Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
                                                                                                               0.30
  Min Ch El (ft)
                                          54.78
                                                                                                 0.01
                                                                                                                                  0.01
  Alpha
Frctn Loss (ft)
                                                                                                 0.00
                                                                                                                  0.92
                                                                                           18839.45
                                                                                                            13920.23
  C & E Loss (ft)
                                                        Cum SA (acres)
                                                                                                               769.05
```

Warning: Divided flow computed for this cross-section

The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rio Grande

RS: 128.5

| TI | NTE | TT | т | |
|----|-----|----|---|--|

Description: Bathymetric elevations translated from IBWC 2008 Cross-sections Station Elevation Data
Sta Elev Sta num= 459 Sta 16.4 19.68 55.77 127.93 86.23 77.9 79.18 22.96 62.33 137.77 80.54 77.86 79.38 81.65 78.18 26.24 75.45 89.03 89.07 78.44 85.29 78.62 108.25 78.76 144.33 170.58 291.95 79.54 79.28 209.94 328.03 79.34 79.47 219.78 347.72 79.57 79.18 252.59 357.56 79.31 268.99 79.43 370.68 79.28 455.97 547.82 462.53 564.22 79.49 79.26 79.25 79.45 508.45 619.98 79.43 79.19 79.3 482.21 528.13 79.24 79.51 600.3 626.54 711.83 757.76 659.35 79.35 685.59 79.5 698.71 80.3 701.99 79.74 75.23 724.95 70.98 767.6 73.21 72.7 790.56 72.08 823.36 71.93 846.33 72.14 888.97 859.45 72.21 905.37 72.08 1102.19 72 964.42 72.27 1115.31 72.25 990.66 72.47 1134.99 72.39 1062.83 72.12 1033.3 1151 4 72 33 1177 64 72 23 1200 6 72.44 1220.28 73.26 1233 4 74.17 1266.21 74.56 1276.05 75.68 1285.89 75.42 1295.73 75.7 1246.52 75.58 1328.53 75.7 1531.91 1312.13 75.77 1344.93 75.65 1387.58 75.84 1426.94 75.84 75.88 1581.12 76.21 1814.02 76.24 1689.37 76.34 1771.38 76.63 1941.95 76.11 1741.85 76.46 1866.5 76.57 1896.03 77.12 2069.88 76.45 1935.39 78 2073.17 76.54 1991.16 79.56 2122.37 2040.36 78.86 2096.13 79.05 78.03 2210.94 78.25 2250.31 78.63 2479.93 78.22 2319.19 78.55 2525.86 2132.21 78.59 2161.74 78 47 78.51 2374.96 78.41 2456.97 2538.98 78.67 2575.06 78.95 2581.62 78.84 2630.83 79.09 2637.39 78.95 79.17 2732.52 80.04 3024.47 80.23 3195.06 80.17 3309.87 2883.42 79.51 2958.87 79.88 2988.39 79.85 2998.23 80.07 3126.17 80.5 3267.22 80.32 3172.09 80.1 3296.75 80.11 3099.93 80.22 3244.26 3227.86 80.37 80.28 3421.4 79.93 3529.65 79.97 3434.52 80.08 3552.62 80.15 3487.01 79.8 3569.02 3349.23 79.93 3500.13 80.02 3585.42 79.94 3660.87 79.78 3742.88 79.83 3667.43 79.97 3785.52 3595.26 79.95 3624.79 79.72 3634.63 3693.67 79.77 3700.23 80.03 3726.48 80.01 79.76 3854.41 79.83 3939.7 79.8 4044.67 79.75 3811.77 79.91 3831.45 79.74 3926.58 3798.65 80.05 3870.81 79.74 79.64 3956.1 79.5 4061.08 3972.5 79.63 4011.87 79.59 4031.55 79.82 79.64 4110.28 80.15 4218.53 80.72 4175.89 79.58 4248.06 81.11 4192.29 79.67 4261.18 4074.2 79.93 4136.52 81 42 79.93 4225.09 4202.13 80.34 4346.47 79.76 4435.03 81.99 4549.84 4290 7 79 8 4297 26 80 23 4316 94 80 1 4323 5 79.88 80.23 4369.43 79.82 4517.04 79.78 4392.39 80.07 4526.88 79.98 4425.19 80.45 4543.28 80.76 4487.52 62 4582.65 56.45 4662.65 57.75 4753.23 66.61 4799.15 76.76 4562.97 55.35 4604.65 69.38 4566.25 68.26 4579.37 4600.65 55.05 4622.65 55.85 4649.65 57.15 4670.65 4769.63 57.25 4688.65 61.58 4779.47 57.25 4703.65 63.6 4786.03 57.35 4713.65 65.97 4795.87 67.55 77.36 4845.08 79.7 4946.76 79.45 4982.85 74.26 4825.39 77.13 4923.8 79.12 4963.17 4808 99 72.08 4815.55 76.44 4835.23 77 16 77.32 4874.6 77.42 4933.64 4950.04 80.32 4956.6 80.19 4969.73 78.84 78.71 5084.54 78.65 5228.87 78.82 5094.38 78.35 5238.71 78.67 5127.18 78.5 5274.79 5058.3 78.5 5189.51 5166.55 78.45 78.69 5409.28 78.97 5622.49 78.59 5438.8 78.79 5678.25 5281.35 78.27 5310.87 78.67 5346.95 5497.84 78.8 5520.8 78.63 5537.2 78.97 78.77 5717.61 78.81 5898.02 79.04 5806.17 78.81 5937.38 78.81 5858.66 79.06 5950.5 5711 05 79.03 5776.65 78 96 79.04 5904.58 5881.62 78.39 6035.78 78.7 6107.95 78.71 6137.47 78.88 6170.27 78.82 6199.79 79.12 79.06 6291.63 79.23 6432.68 78.85 6373.64 79.09 6488.44 6209.63 79.02 6265.39 79.22 6353.96 78.93 6403.16 78.91 6458.92 6393.32 78.93 79.15 6580.29 79.59 6708.21 78.9 6599.97 79.33 6754.13 79.4 6622.93 79.2 6806.62 6498.28 79.12 6645.89 79.53 6829.58 6681.97 80.12 6888.62 6914.86 83.96 6901.74 81.26 6993.59 84.55 6908.3 81.24 7006.71 80.46 6895.18 81.68 6898.46 83.56 6921.42 81.78 6944.38 7059 19 81.41 7085.43 81 22 7141 19 81.5 7190.39 81 33 7210 07 81 47 81.12 7311.76 80.66 7495.45 81.16 7347.84 80.45 7515.13 80.64 7462.65 80.54 7547.93 79.72 7679.14 78.09 7987.47 7436.4 80.26 7567.61 7744.74 80.34 7593.85 79.35 7800.5 80.02 7639.77 79.07 7898.9 79.94 7652.89 78.22 7941.55 79.78 77.67 77.53 8076.03 77.7 8289.25 80.71 8443.42 81.75 8604.15 77.76 8023.55 77.75 8266.28 77.41 8220.36 78.51 8328.61 7997.31 77.68 8135.07 77.47 78.11 8322.05 8253.16 8394 21 80 06 8410 62 81 46 8476 22 81 69 8486 06 81 92 81.63 8525.42 81.72 8630.39 8696 81.21 8712.4 81.13 8738.64 81.26 8755.04 80.38 8761.6 80.65 8787.85 8892.82 81.01 8846.89 80.54 8919.06 81.18 8856.73 80.24 8942.02 80.71 8860.01 80.58 8958.42 80.89 8837.05 80.56 8909.22 80.45 8964.98 80.94 8971.54 77.02 9010.91 79.62 8981.38 72.47 9020.75 79.32 8987.94 78.23 8994.5 68.21 9046.99 69.76 9037.15 65.15 9119.15 63.88 9188.04 9063.39 67.63 9092.91 65.78 9099.47 64.68 9132.28 64 82 64.4 9174.92 63.94 9197.88 9142.12 64.34 9230.68 64.79 9237.24 9211 64.66 9253.65 65.13 9263.49 65.68 9286.45 65.54 9299.57 66.1 9309.41 66.96 9315.97 66.25 9342.21 66.61 9404.54 67.01 9420.94 9427.5 9368.46 66.79 9391.42 66.81 67.07 9450.46 9519.35 67.2 9466.86 67.91 9525.91 67.55 9476.7 67.65 9555.43 67.26 9489.83 67.89 9581.67 67.92 9502.95 67.5 9591.51 67.48 68.37 67.92 9630.88 9604.63 68 9650.56 67.69 9660.4 67.87 9686.64 67.4 9706.32 67.62 9719.44 67.32 9732.57 67.34 9748.97 66.96 9801.45 9827.69 66.51 9847.38 66.04 9873.62 65.82 9896.58 65.27 9932.66 64.87 63.7510008.11 64.0110047.47 63.6510178.68 63.8110099.96 64.0110122.92 64.0910155.72 64.310201.64 10145.88 63.7410211.49 63.86 10247.57 10319.73 66.4310260.69 76.410332.86 67.7310267.25 77.1310365.66 68.0310277.09 76.6610401.74 69.2810296.77 76.77 10424.7 10437.82 76.1810457.51 76.2110493.59 77.0510503.43 76.9510519.83 77.33 75.39 10641.2 10680 56 76 210733 05 76 5610739 61 76 510775 69 77.1410821.62 77.3110900.34 77 77 77.8610877.38 75.5910913.46 78.0510893.78 80.2810933.15 76.66 10923.3 10906.9 82.4810936.43 83.75 10942.96 84.7410962.48 84.7510972.25 82.0410982.01 Manning's n Values

```
Printed at 13:42 on 03 Oct 2017
                           .066 2096.13 .085 4549.84
                                                                                                   .07 4562.97
                                                                                                                                    .025 4799.15
  4950.04
                           .066
               4549.84 4950.04 Lengths: Left Channel
Bank Sta: Left
                                                                                                                                    Coeff Contr. Expan.
                                                                                                              Right.
                                                          1964.77
                                                                                          1391 1506.6
Ineffective Flow num=
      Sta L Sta R
0 4549.84
                                            Elev Permanent
                                       80.76
  4950.0410982.01
                                         80.32
Left Levee Station= 16.4
Right Levee Station=10962.48
                                                                             __evation=
Elevation=
1
                                                                                                                84.75
## Star | Star |
CROSS SECTION OUTPUT Profile #Design Flow
    E.G. Elev (ft.)
                                                               82.20
                                                                                    Element
                                                                                                                                            Left OB
                                                                                                                                                                    Channel
                                                                                                                                                                                           Right OB
                                                                                                                                                                   0.046
1391.00
                                                                                   Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
                                                                                                                                                                                            1506.60
                                                                                                                                          1964.77
    W.S. Elev (ft)
Crit W.S. (ft)
                                                                82.14
                                                                                                                                        6200.96
18402.81
                                                                                                                                                                   6328.77
6328.77
                                                                64 68
    E.G. Slope (ft/ft)
                                                        0.000136
                                                                                                                                                                                          20065.48
    Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
Max Chl Dpth (ft)
                                                        20000.00
10887.56
                                                                                   Flow (cfs)
Top Width (ft)
                                                                                                                                           1767.11
4527.23
                                                                                                                                                                 14628.17
                                                                                                                                                                                            3604 72
                                                                                  Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
Cum Volume (acre-ft)
Cum Volume (acre-ft)
                                                                                                                                                                                               0.37
                                                                0.90
27.09
                                                                                                                                            0.28
1.37
                                                                                                                                                                        2.31
                                                                                                                                           151390.7
    Conv. Total (cfs)
Length Wtd. (ft)
                                                         1713427.0
                                                                                                                                                                  1253215.0
                                                                                                                                                                                              308821.0
                                                         1469.42
                                                                                                                                           4530.50
                                                                                                                                                                    412.84
                                                                                                                                                                                           5962.35
                                                                                                                                                                     0.13
    Min Ch El (ft)
                                                               55.05
                                                                                                                                                 0.01
    Alpha
                                                                  4.92
                                                                                                                                                 0 00
                                                                                                                                                                          0 30
                                                                                                                                                                                                  0.01
    Frctn Loss (ft)
                                                                                                                                      18061.45
                                                                  0.08
                                                                                                                                                                 13506.03
    C & E Loss (ft)
                                                                 0.00
                                                                                  Cum SA (acres)
                                                                                                                                           5410.34
                                                                                                                                                                      742.16
                                                                                                                                                                                            3648.75
Warning: Divided flow computed for this cross-section
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.
Note:
                   Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
CROSS SECTION
RIVER: Rio Grande
                                                         RS: 128.23*
REACH: Lower Reach
Description:
Station Elevation Data
                                                             Elev
          Sta
                         Elev
                                             Sta
                                                                                 Sta
                                                                                                 Elev
                                                                                                                     Sta
                                                                                                                                    Elev
                                                                                                                                                                        Elev
                                       13.43
                       86.59
80.42
                                                                            24.94
61.52
                                                                                              88.66
78.89
                                                                                                                28.6
68.84
                                                                                                                                 85.92
78.46
                                                                                                                                                   32.26
76.16
                                                                                                                                                                     81.46
78.54
                                                           88.56
       35.91
                                                           80.13
                                      101.76
189.71
                                                                                                            146.21
227.78
306.6
      90 79
                        78.04
                                                            78 49
                                                                          127 36
                                                                                               79 01
                                                                                                                                   78.91
                                                                                                                                                 160.28
                                                                                                                                                                      77 94
                                       273.99
                                                           79.04
                                                                                                                                   79.08
    252.24
                        78.97
                                                                          284.87
                                                                                               78.85
                                                                                                                                                 322.93
                                                                                                                                                                      79.01
     426.25
                        79.08
                                        439.85
                                                            79.33
                                                                             461.6
                                                                                               79.17
                                                                                                              488.78
                                                                                                                                   79.05
                                                                                                                                                 522.42
                                                                                                                                                                       79.22
                                                                                                              617.53
733.49
807.73
880.89
    540.45
676.05
                        79.08
79.38
                                       554.04
697.99
                                                           79.22
79.15
                                                                           581.23
705.31
                                                                                                                                   79.35
79.29
                                                                                                                                                 635.82
771.16
                                                                                                                                                                      79.16
                                                                                               79.41
                        79.98
73.83
                                       789.44
851.63
     785 79
                                                            79.62 800.42
                                                                                               76.63
                                                                                                                                   75.01
                                                                                                                                                 815 05
                                                                                                                                                                      74 19
                                                                                               75.36
                                                                                                                                   75.08
     826.02
                                                                                               74.59 997.94
74.84 1111.34
75.47 1272.28
    931.96
                        74.53
                                         950.4
                                                            74.64
                                                                         980.91
                                                                                                                                  74.72 1016.23
                                                                                                                                                                      74.64
                                                           74.71 1070.63
74.84 1252.8
                                                                                                                                  74.7 1171.23
75.19 1301.74
                           74.8 1059.75
                        74.66 1231.05
  1190.26
                                                                         1252.8
                                                                                                                                                                       75.23
  1345.24
                        75.08 1353.4
75.1 1429.58
                                                           75.54 1369.71
75.78 1440.55
                                                                                               75.53 1382.02
75.61 1488.1
                                                                                                                                  74.97 1394.18
75.71 1506.39
                                                                                                                                                                        75.6
  1418.61
                        75.83 1592.67
76.02 1729.52
                                                           75.88 1616.12
75.89 1823.77
                                                                                               75.72 1649.76
75.9 1846.57
                                                                                                                                  75.85 1676.95
75.85 1864.55
  1553.95
    1698.7
  1890.47
                         75.88 1940.68
                                                           76.03 1992.34
                                                                                                 75.9 2011.37
                                                                                                                                         76 2084.77
                                                                                                                                                                      76.12
                                                                                              75.83 2245.19
77.95 2340.47
77.46 2481.73
77.82 2631.26
                                                           75.71 2227
77.22 2318.45
                                                                                                                             76.09 2264.22
78.4313 2364.82
   2150.03
                         75.83 2160.91
                                                                                                                                                                      78.09
  2296.85
                         76.36 2314.78
                        77.61 2417.21
77.67 2544.26
                                                           77.21 2451.82
77.56 2590.48
  2384.28
                                                                                                                                  77.39 2517.08
                                                                                                                                  78.18 2647.59
                                                                                                                                                                      78.04
  2530.67
                                                           78.35 2772.03
79.13 2947.61
                                                                                               78.46 2823.24
79.11 2982
                                                                                                                                  78.72 2878.11
79.49 3009.19
    2693 8
                        78.22 2699.24
   2892.28
                         78.86 2930.34
                                                                                              79.11 2982
79.26 3112.51
79.83 3379.25
80.05 3531.22
                                                                                                                                  79.45 3166.88
79.74 3422.46
79.98 3569.47
  3020 07
                         79.41 3041.82
                                                            79.55 3061.01
                                                                                                                                                                      79 55
                                                           79.45 3349.98
79.99 3512.19
                         79.85 3468.68
  3430.61
                                                                                                                                                                      80.07
                        80.01 3624.33
80.07 3746.01
                                                           80.16 3649.94
80.15 3792.24
                                                                                               79.97 3682.87
79.92 3805.83
                                                                                                                                  79.92 3697.5
79.99 3816.71
   3612.79
   3713.39
                                                                                                                                                                        79.8
                        79.99 3876.52
79.97 4004.76
                                                           79.79 3909.65
79.68 4015.73
                                                                                              79.96 3942.57
79.9 4048.66
                                                                                                                                  79.96 3968.19
79.7 4064.13
   3860.21
                                                                                                                                                                      79.76
   3990.72
                        79.73 4096.21
79.94 4227.89
                                                           79.9 4125.47
79.86 4242.53
79.75 4385.19
                                                                                              79.69 4132.79
79.69 4257.17
79.78 4398.57
  4080 45
                                                                                                                                  79.83 4162.06
                                                                                                                                                                      79 69
                                                                                                                                 79.83 4162.06
79.8 4278.94
79.63 4418.11
79.45 4542.67
80.57 4632.4
                                                                                                                                                                      79.7
79.78
```

4304.71

4553.54

4643.27

4830.88

5034.8

5136.52

5189.54

5262.85

5305.02

5536.66

5640.22 5763.37

5942.49

6230 77

6499.88

6599.81

6765.35

6916.49

5380.6 5421.64 79.92

5094.7879.97818 5099.04

80.73 4656.86 79.35 4741.15

70.03 5151.36

61.51 5195.66 55.44 5271.25

57.91 5313.94 64.03 5392.68

73.31 5426.47

77.58 5506.14 79.72 5542.25

78.68 5648.61 78.08 5771.76

78.26 5985.19

78 17 6255 96

79.32 6519.86

79.35 6647.79 79.45 6790.54

79.18 6933.28 79.27 7109.6

4323 79.5 4466.54 79.55 4564.42

80.05 4844.47 79.64 4858.07 79.26 4928.76 79.6 4941.19 79.17 5048.4479.70148 5056.55

79.49 4502.24 79.78 4610.65

81.48 4667.74 79.66 4749.31

79.48 5108.68 67.45 5169.25

60.84 5200.14 53.64 5284.5 58.37 5339.81

64.67 5399.92

75.04 5433.71

77.83 5513.38 79.23 5553.45

78.56 5676.6 78.16 5820.28

78.19 5995.18 77.98 6146.81

78.01 6300.75

77.71 6454.9 79.83 6544.85

79.36 6670.18 79.23 6812.92

79.51 6972.46 79.48 7129.2

79.68 4516.87 80.21 4619.29

81.24 4681.34 79.56 4798.54

79.83 4879.01 79.32 4972.27

80.07 5072.87

77.16 5119.69 65.77 5174.76

76.85 5440.96 79.37 5525.45 78.83 5581.44

78.6 5710.19 78.11 5860.26

78.28 6015.17

78.05 6339.93

79.84 6559.84

79.45 6723.37 79.35 6838.11

79.27 7003.25 79.87 7179.57

56.76 5229.26 56.02 5250.26 54.4 5301.955.03925 5304.37 59.09 5351.48 59.99 5357.576 66.41 5404.75 68.26 5411.99

77.55

80.43

79 54

80.2

64.32

77.69

78.62

78 07

79.21

79.35

79.39

81.26 4692.46 79.94 4820.48

79.44 4890.7 79.35 4988.58

81.82 5089.4 75.51 5126.58 64.59 5180.26

79.8 5531.05 78.97 5615.4 5615.4

78.34 5729.78 78.33 5885.24

78.92 6026.46 77.93 6180.39

77.94 6367.91 78.15 6489.88 79.33 6569.83

79.2 6756.95 79.22 6846.51

79.59 7025.63 80.03 7185.17

59.99 5357.5760.83488 68.26 5411.99 69.11

5465.1

```
82.1 7207.56
80.61 7347.5
                                                                                          80.91 7227.15
80.47 7395.08
80.34 7607.79
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7437.06
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                                         80.64 7325.11
                                                                  80.61
                                                                                                                   80.63
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                                         80.19 7697.36
                                                                  80.04 7714.15
                                                                                          80.09 7742.14
                                                                                                                   79.88
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79.37 7957.65
                                         79.75 7820.5
79.2 8041.61
  7758.93
                                                                  79.74 7831.7
                                                                                            79.6 7854.09
 7909.03
                                                                  78.66
                                                                               8078
                                                                                           78.63 8117.18
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                                         78.32 8243.12
78.79 8464.24
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79.87 8478.24
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80.32 8506.23
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8374.68
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                 80.1 8889.68
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77.09 8990.44
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77.91 8976.44
71.25 9021.23
68.87 9094
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74.07 8998.84
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72.27 9012.83
 8982.04
                                                                                                                    71.31
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                 70.85 9060.41
                                         69.59 9066.01
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                                                                                                                   69.09
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69.65 9295.53
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69.97 9429.88
69.45 9519.44
68.65 9620.2
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69.73 9273.13
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                                                                                          69.35 9245.14
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 9340.31
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                                                                                                                   70.18
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69.86 9497.04
 9485.85
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                                         68.65 9620.2
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10087.62
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10415.09
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78.67
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                                                                  84.6210668.59
                                                                                           81.1910675.07
                                                                                                                   80 37
Manning's n Values
                                       n Val
      Sta n Val Sta
0 .066 3009.19
25.45 .066
                                          .085 5099.04
                                                                     .07 5119.69
                                                                                            .025 5399.92
                                                                                                                      .07
 5525.45
                                       Lengths: Left Channel
1964.77 1391
2
                                                                nannel Right
1391 1506.6
Bank Sta: Left
                         Right
                                                                                            Coeff Contr.
                                                                                                                   Expan.
          5099.04 5525.45
5099.04 SI num= 2
Theffective Flow num= 2
The Sta R Elev Permanent
    Sta L Sta R
0 5099.04
                          79.48
 5525.4510675.07
                               79.8
                  /5.07 /5.0
Station= 24.94
Station=10655.65
                                                          Elevation=88.65667
Left Levee
Right Levee Scale:
Blocked Obstructions
The Stank Elev
Right Levee
                                                         Elevation=
                                     num=
 Sta L Sta R Elev
8963.8610685.03 77.14
CROSS SECTION
RIVER: Rio Grande
REACH: Lower Reach
                                       RS: 127 97*
INPUT
Description:
Station Elevation Data
                                       num=
                                                     460
                                                                                          Elev
88.24
79.34
       Sta
0
                Elev
84.16
                            Sta
15.45
                                         Elev
87.76
                                                     Sta
18.02
                                                                   Elev
                                                                              33.48
                                                                  88.06
                                                                                                       36.43
                                                                                                                   86.62
                80.64
78.21
77.27
                           45.59
137.27
                                         80.31
                                                    61.73
167.26
    42 34
                                                                  80.05
                                                                                                       95.54
                                                                                                                     78 7
                                         78.67
77.59
                                                                  78.63
   106.12
                                                                                           77.39
78.37
   209.26
                           215.26
                                                    224.26
                                                                  77.22
                                                                             236.26
                                                                                                     248.25
                                                                                                                   77.13
                                         77.03
                                         78.36
                                                    338.24
                                                                  78.63
                                                                                           78.67
   308.24
                 78.68
                           320.24
                                                                             362.23
                                                                                                     386.24
                                                                                                                   79.08
                78.75
78.87
                           404.23
491.21
                                         78.91
79.38
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515.21
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79.05
                                                                            446.22
527.21
                                                                                           78.88
                                                                                                     467.22
                                                                                                                   79.07
                                                                                           79.18
                                                                                                       545.2
   476.22
                                                                                                                     78.8
                 78.94
79.04
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79.22
                                                    617.2
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79.05
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751.8
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79.3
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764.17
   582.31
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                           815.16
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  1298.09
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  1429.76
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75.74 1763.03
76.1 1898
 1517 06
                  77 8 1544 06
                                         75.55 1556.05
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                                         75.69 1661.04
75.91 1856.01
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75.8 1880
                 75.74 1826.01
 1781.02
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 1931
2017.98
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                                         75 08 2389 92
                                                                                           75.03 2431.91
                                                                                                                   74 94
                                         75.04 2482.9
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 5029 53
                 79 44 5041 53
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                                                                                           80 23 5092 53
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 5443.48
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56.92 5859.76
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  5663
5725.84
                      76.32 5672.31 68.24 5735.15
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67.27 5749.12
                                                                                                                       72.95 5711.87
66.54 5774.72
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65.01
                      65.28 5788.68
57.63 5838.46
                                                       64.55 5793.33
  5784.03
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  5817.63
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  5888.16
                      56.19 5895.26
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                                                                                      59.32 5966.93
67.77 6023.46
77.73 6056.22
  5937.86
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62.23 6007.98
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66.51 6015.72
                                                                                                                       59.63 5981.82
70.56 6028.1
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                                                                                                                                                          71.6
                                                                                                                       78 6088.48
78.85 6175.35
  6034.3
6093.13
                      74.53 6041.36
79.04 6100.87
                                                      77.14 6046.68
79.29 6124.05
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77.6 6489.82
77.54 6576.7
77.1 6770.64
77.6 6899.44
                      78.45 6270.06
77.78 6423.61
79.04 6531.19
                                                      78.12 6297.87
77.86 6481.54
77.75 6539.47
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77.77 6506.36
77.16 6638.54
                                                                                                                                                        77.97
  6202.85
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77.09
  6514.64
                                                      77.29 6729.8
77.01 6887.02
  6643.17
6841.51
                      77.2 6684.89
76.85 6870.47
                                                                                                                       77.15 6798.45
79.75 6907.72
                                                                                                                                                       77 09
                                                                                      77.6 6899.44
79.82 6965.64
79.66 7148.39
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80.96 7484.43
79.9 7609.58
79.78 7851.1
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79.61 7470.52
80.05 7509.92
                                                      77.01 6887.02
80.82 6957.37
79.54 7127.53
79.46 7324.52
79.6 7479.79
79.89 7553.96
                                                                                                                      79.75 6907.72
79.57 6983.85
79.55 7252.68
79.35 7412.59
79.99 7489.06
79.72 7660.77
  6924.27
  7266.59
  7428.81 7493.7
                                                                                                                                                        79.72
  7697.64
7936.34
                      79.81 7750.94
79.5 8053.85
                                                      79.72 7813.87
79.54 8075.4
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79.32 8190.38
  8211.08
8483.28
                      79.18 8246.89
79.08 8534.26
                                                      78.98 8309.46
79.68 8550.37
                                                                                      78.97 8411.43
79.99 8599.16
                                                                                                                       78.8 8443.88
80.38 8666.22
                      79.08 8534.26
80.04 8747.49
78.67 8905.08
75.66 8976.93
73.09 9062.68
72.88 9148.43
                                                      79.66 8777.61
78.53 8937.53
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78.6 8942.16
                                                                                                                       79.22 8863.36
78.13 8958.38
    8710.4
                                                                                                                                                       79.09
                                                                                                                                                       77.62
73.19
                                                                                      74.3 9007.06
72.7 9102.08
73.17 9180.88
  8969.98
                                                       74.78 8988.52
                                                                                                                       74.08 9032.55
  9055.73
9129.89
                                                      72.86 9095.12
73.17 9164.65
                                                                                                                       73.09 9111.35
73.5 9185.51
                                                                                                                       72.73 9317.62
70.98 9447.4
  9204.05
                      73.14 9222.6
                                                      73.31 9248.09
                                                                                       73.16 9292.12
                                                                                                                                                       72 07
    9354.7
                       71.63 9373.24
                                                       71.21 9380.19
                                                                                       71.35 9389.46
                      69.68 9491.44
65.04 9717.19
                                                      69.01 9579.51
64.94 9762.71
                                                                                      67.32 9605.47
64.41 9795.04
    9461.3
                                                                                                                       66.61 9658.3
                     64.71 9845.45
71.07 9915.79
76.84 9992.04
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73 9928.21
76.7810036.07
                                                                                      65.98 9882.7
75.77 9940.62
77.0610049.97
                                                                                                                       67.65 9894.69
77.57 9957.17
76.610096.33
    9828.9
                                                                                                                                                       70.03
  9903.38
9965.44
                                                                                                                                                       77.32
                                                      77.3510255.09
84.3210348.81
10191 35
                      76.5610246.81
                                                                                       77.6710279.91
                                                                                                                          77 910308 39
10321.13
                     82.6710335.02
                                                                                       84.4910361.68
                                                                                                                       80.8610368.13
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .114 5602.47 .066 5810.06
                                                                                                                                                       n Val
                                                                                    n Val Sta
.025 5915.98
                                                                                                                      n Val Sta
.066 6100.87

        Bank Sta: Left
        Right
        Lengths: Left
        Channel
        Right

        5602.47
        6100.87
        1964.77
        1391
        1506.6

        Left Levee
        Station=
        33.48
        Elevation=88.24333

        Right Levee
        Station=10348.81
        Elevation=
        84.49

                                                                                                                        Coeff Contr.
                                                                                                                                                       Expan.
7490.5310333.91 80.92
CROSS SECTION
```

| CITODD D | 2011011 | | | | | | | | |
|----------|--------------------------|--------------------|----------------|-------------------|----------------|--------------------|----------------|--------------------|----------------|
| | | | | | | | | | |
| | Rio Grande
Lower Read | | RS: 12 | 7 7 | | | | | |
| REACH. | Lower Read | 311 | R5 · 12 | /./ | | | | | |
| INPUT | | | | | | | | | |
| Descrip | tion: RGV- | -02, Begi | n Wall, | Bathymet | ric elev | vations | translate | ed from | IBWC |
| | | 3 Cross-s | | | | | | | |
| | Elevation | | num= | 459 | | | | | |
| St | a Elev
0 81.72 | Sta
19.39 | Elev
87.11 | Sta
22.62 | Elev
87.57 | Sta
42.02 | Elev
87.83 | Sta
45.25 | Elev
86.44 |
| 51.7 | | 90.5 | 79.74 | 109.89 | 79.02 | 116.35 | 78.48 | 132.56 | 78.2 |
| 155.5 | | 188.32 | 78.35 | 198.16 | 77.6 | 204.72 | 76.35 | 211.28 | 75.91 |
| 234.2 | | 240.81 | 76.63 | 250.65 | 76.06 | 263.77 | 76.34 | 276.89 | 75.98 |
| 286.7 | | 296.57 | 75.86 | 303.13 | 75.99 | 316.25 | 77.77 | 322.81 | 78.1 |
| 332.6 | | 342.49 | 78.31 | 355.61 | 77.87 | 375.29 | 78.23 | 401.53 | 78.33 |
| 427.7 | | 440.9 | 78.43 | 447.46 | 78.65 | 483.54 | 78.97 | 493.38 | 78.68 |
| 516.3 | | 526.18 | 78.67 | 542.58 | 79.43 | 568.82 | 78.93 | 581.94 | 79.13 |
| 601.6 | | 608.18 | 78.68 | 663.95 | 78.66 | 680.35 | 79.03 | 713.15 | 78.62 |
| 722.9 | | 745.95
867.32 | 78.86
79.14 | 762.35
896.84 | 79.11
79.08 | 768.91
913.24 | 78.89
79.41 | 831.24
932.92 | 79.25
79.14 |
| 975.5 | | 988.69 | | 1024.77 | | 1047.73 | | 1093.65 | 79.14 |
| 1106.7 | | 1123.17 | | 1136.29 | | 1165.82 | | 1182.22 | 79.91 |
| 1195.3 | | 1241.26 | | 1260.94 | | 1290.46 | | 1303.59 | 80.12 |
| 1329.8 | | 1365.91 | | 1375.75 | | 1415.11 | | 1424.95 | 80.19 |
| 1447.9 | 1 79.8 | 1497.12 | 80.03 | 1513.52 | 80.71 | 1523.36 | 81.56 | 1543.04 | 81.42 |
| 1569.2 | | 1582.4 | | 1605.36 | | 1634.89 | | 1644.73 | 81.16 |
| 1654.5 | | 1664.41 | | 1670.97 | | 1693.93 | | 1707.05 | 75.89 |
| 1720.1 | | 1730.01 | | 1756.25 | | 1772.66 | | 1792.34 | 75.72 |
| 1821.8 | | 1857.94 | 75.56 | 1864.5 | | 1933.39 | | 1953.07 | 75.73 |
| 2002.2 | | 2018.67
2117.08 | 75.84 | 2028.51 2130.2 | 75.62 | 2035.07 2179.4 | | 2061.31
2185.96 | 76.18
75.86 |
| 2195. | | 2212.2 | | 2238.44 | 75.39 | 2261.4 | | 2267.96 | 75.39 |
| 2330.2 | | 2346.69 | | 2353.25 | | 2382.77 | | 2405.73 | 75.41 |
| 2415.5 | | 2438.53 | | 2468.05 | | 2487.73 | | 2527.09 | 75.22 |
| 2553.3 | 4 74.93 | 2563.18 | 75.16 | 2605.82 | | 2618.94 | 73.9 | 2625.5 | 74.24 |
| 2664.8 | 6 74.13 | 2684.54 | 74.48 | 2697.66 | 74.26 | 2720.62 | 74.71 | 2743.58 | 74.38 |
| 2766.5 | | 2782.95 | | 2796.07 | | 2809.19 | | 2822.31 | 76.62 |
| 2838.7 | | 2845.27 | | 2864.95 | | 2871.51 | | 2894.47 | 75.74 |
| 2920.7 | | 2940.39 | | 2969.91 | 76.03 | 3006 | | 3035.52 | 75.96 |
| 3048.6 | | 3065.04
3166.72 | 77.27 | 3081.44 | | 3114.24 3206.09 | | 3127.36
3219.21 | 76.72
77.51 |
| 3261.8 | | 3268.41 | | 3288.09 | | 3307.77 | | 3314.33 | 78.4 |
| 3324.1 | | 3366.81 | | 3399.61 | | 3409.45 | | 3442.26 | 78.9 |
| 3465.2 | | 3501.3 | | 3547.22 | | 3553.78 | | 3609.54 | 80.2 |
| 3642.3 | | 3655.47 | | 3668.59 | 80.15 | 3681.71 | | 3698.11 | 79.23 |
| 3714.5 | 1 79.47 | 3750.59 | 79.44 | 3766.99 | 79.63 | 3816.19 | 79.5 | 3832.59 | 79.72 |
| 3855.5 | | 3862.11 | | 3885.08 | 79.31 | 3931 | 79.1 | 3947.4 | 79.37 |
| 3957.2 | | 3996.6 | | 4026.12 | | 4075.32 | | 4104.85 | 79.42 |
| 4114.6 | | 4140.93 | | 4150.77 | | 4196.69 | | 4219.66 | 79.47 |
| 4249.1 | | 4272.14 | | 4288.54 | 79.6 | 4327.9 | | 4360.71 | 79.55 |
| 4370.5 | | 4419.75
4531.28 | 79.74 | 4436.15
4560.8 | | 4459.12
4577.21 | | 4468.96
4587.05 | 79.74
79.58 |
| 4603.4 | | 4531.28 | | 4632.97 | | 4646.09 | | 4669.05 | 79.58 |
| 4688.7 | | 4695.3 | | 4718.26 | | 4741.22 | | 4757.62 | 79.65 |
| 4783.8 | | 4810.1 | | 4826.51 | | 4836.35 | | 4862.59 | 79.87 |
| 4875.7 | | 4882.27 | | 4905.23 | | 4915.07 | | 4934.76 | 79.48 |
| 4964.2 | 8 79.82 | 5006.92 | 79.32 | 5020.04 | 79.5 | 5052.85 | 79.53 | 5079.09 | 79.84 |
| 5088.9 | 3 79.55 | 5174.22 | 79.59 | 5184.06 | 79.93 | 5203.74 | 79.64 | 5229.98 | 79.78 |
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79.55 5262.78
                                                                    79.87 5318.55
                                                                                             79.58 5328.39
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79.11 5492.4
  5341.51
                 79.56 5374.31
79.3 5449.76
                                           79.25 5384.15
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79.32
                                           79.54 5476
79.97 5558.01
                  79.84 5541.61
                                                                    80.29 5574.41
  5518.64
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                                          80.33 5630.17
78.84 5731.86
                                                                                             81.35 5659.7
79.14 5764.66
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                  79.62 5613.77
                                                                    82.34 5643.29
  5679.38
                  79.44 5712.18
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                  79.82 5804.03
79.5 5886.03
                                          79.27 5823.71
78.68 5912.28
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78.46 5945.08
                                                                    79.18 5840.11
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                                                                    78.87 5918.84
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                  79.14 5977.88
                                          78.22 6010.69
77.86 6086.13
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77.51 6102.53
                                                                                             79.3 6036.93
78.63 6112.37
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78.79 6207.48
73.01 6286.16
                                                                    79.53 6161.58
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                                          80.85 6155.02
                                                                                             79.46 6171.42
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                                                                                             74.5 6243.55
67.08 6338.62
                                                                    68.16 6318.95
  6259.94
                                           71.14 6305.83
                                                                   66.23 6394.35
58.03 6464.46
                                                                                             65.34 6400.9
57.53 6484.46
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                  67.31 6374.68
                                          65.42 6387.79
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  6407.46
                  60.76 6424.46
                                          59.03 6444.46
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                                                                   56.53 6544.46
50.83 6614
77.65 6656.61
78.5 6777.91
77.16 6895.93
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55.83 6604.46
71.66 6650.06
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                                                                                             78.39 6676.28
78.06 6794.3
77.61 6912.32
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77 6984.45
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  6846.76
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77.17 7023.79
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81.99 7345.06
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76.17 7299.16
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80.27 7315.56
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                                          81.8 7354.9
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78.99 7971.22
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                 79.89 7528.65
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                  78.86 7935.16
79.27 8135.14
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79.54 8240.04
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                                           79.64 8476.08
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                  79.31 8617.05
                                           79.56 8630.16
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                 79.28 8839.97
77.21 8971.11
                                          78.19 8862.92
77.38 8990.78
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77.28 9033.4
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76.67 9148.14
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  9056.34
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                                           76.91 9105.52
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                   76 9203.87
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64.33 9630.05
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                 77.63 9738.23
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76.45 9934.93
79.0410009.95
                                                                    77.07 9826.75
  9872.65
                                                                    76.71 9961.16
                                                                                             77.16 9967.72
  9987.39
                                                                    80.8510016.36
                                                                                             83.4310019.56
10041.98
                 84.3610048.38
                                          82.8610054.78
                                                                   80.5310061.19
Manning's n Values num= 5
Sta n Val Sta n Val Sta
0 .114 6194.37 .066 6407.46
                                                                                            n Val Sta
                                                                   n Val
                                                                                                                      n Val
                                                                    .025 6617.27
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. 6194.37 6676.28 1186.43 1486 1991.76 .1

Left Levee Station= 42.02 Elevation= 87.83 
Right Levee Station=10041.98 Elevation= 84.36 
Blocked Obstructions num= 3 
Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R Elev 1664.03 3608.94 80.04 3644.24 5631.98 80.04 7331.1110023.65 81.98
                                                                                                                      Expan.
CROSS SECTION OUTPUT Profile #Design Flow
                                             81.94
                                                                                                    Left OB
   E.G. Elev (ft)
                                                                                                                                      Right OB
                                                                                                                      Channel
                                                            Element
                                                           Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
Area (sq ft)
   Vel Head (ft)
W.S. Elev (ft)
Crit W.S. (ft)
                                                                                                   0.114
1186.43
                                                                                                                    0.050
1486.00
                                               0.04
                                                                                                                                         0 074
                                              81.89
                                              63.50
                                                                                                 13173.10
                                                                                                                     8274.50
                                                                                                                                      2987.18
                                        0.000095
   E.G. Slope
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                         20000.00
                                                                                                   2795.85
                                                                                                                   15592.92
                                                            Flow (cfs)
                                                                                                                                      1611.24
                                                           Top Width (ft)
Avg. Vel. (ft/s)
                                                                                                   6134.79
                                                                                                                     481.91
                                                                                                    0.21
                                              0.82
                                                                                                                         1.88
                                                                                                                                           0.54
                                                           Avg. Vel. (It/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
Shear (lb/sq ft)
Stream Power (lb/ft s)
   Max Chl Dpth (ft)
Conv. Total (cfs)
Length Wtd. (ft)
                                              31.06
                                                                                                        2 15
                                                                                                                        17 17
                                         2052838.0
                                                                                                                    1600486.0
                                          1418.58
50.83
                                                                                                    6137.20
                                                                                                                     493.35
                                                                                                                                       652.49
                                                                                                                         0.10
   Alpha
                                               4.18
                                                                                                        0.00
                                                                                                                         0.19
                                                                                                                                           0.01
   Frctn Loss (ft)
                                               0.09
                                                            Cum Volume (acre-ft)
                                                                                                  15864.13
                                                                                                                   12810.90
                                                                                                                                    10114.77
                                                           Cum SA (acres)
   C & E Loss (ft)
                                               0.01
                                                                                                   4690.48
                                                                                                                      698.55
                                                                                                                                      3212.29
Warning: Divided flow computed for this cross-section
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
              Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:
CROSS SECTION
RIVER: Rio Grande
                                         RS: 127.4
REACH: Lower Reach
TNPUT
Description: RGV-02, Bathymetric elevations translated from IBWC 2008
                    Cross-sections
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Station Elevation Data

Elev

78.19

76.25

77.99

78.15

78.75

79.29

79.02 79.25

79.28

79.04 87.78

Sta

120.43 169.64

281.16

366.44

435.33

694.46

776.46 842.06

973.27

1160 23

1294.72

1399.68

1488.24

1606.33

ta num= Sta El

12.99 71.43

130.27 176.2

304.12

376.28

484.53

573.09 720.7

783.02 871.58

983.11

79 8 1179 91

79.78 1252.08 79.88 1324.24

79.81 1429.2 79.91 1524.32

79.88 1629.29

Elev

86.49

77.74 77.45

78.29

78.35

79.08 78.97

79.39 79.04

79.54

78.8

Sta

25.98 77.93

146.68 182.76

310.68

402.52

494.37

746.94

789.58

992.95

79.51 1189.75

79.57 1265.2 80.03 1340.64

79.71 1455.44 79.91 1547.28

79.92 1635.85

901.1

Elev

80.25 84.42

77.68 77.75

78.15

79.18 79.21

79.11

79.48

79.1

79.39 1009.35 79.9 1120.87

79.69 1222.55 79.96 1271.76 79.83 1360.32

80.15 1462 80.09 1580.08

80.11 1662.09

78.2

32.47 90.91 153.24 228.68

350.04

415.64

504.21

756.78

822.38 933.9 Elev

79.07

78.93

79.3 79.11

81.26 58.44 81.26 107.31

78.21 359.88

79.54 1015.91

79.73 1232.39 79.77 1284.88 79.95 1389.84

79.96 1475.12

79.93 1593.21

80.16 1704.73 80 1829.37

159.8

422.2

537.01

766.62

825.66 953.59 Elev

87.27 79.23

78.2

78.43

79.11

79.25

79.84

79 44

79.71

80.05

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81.17 1954.02
  1963.86
                  80.71 1986.82
                                            80.9 1996.66
                                                                     80.54 2013.06
                                                                                              80.66 2022.9
                                                                                                                       80.23
79.34
                                                                     79.62 2108.18
   2088.5
                  79.49 2098.34
                                           79.11 2104.9
                                                                                              79.05 2114.74
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                                           78.25 2163.94
                                                                     77.53 2183.63
78.13 2226.27
                                                                                              77.46 2186.91
78 2229.55
  2127.86
                  78.49 2144.26
  2190.19
                  78.54 2206.59
                                           78.64 2213.15
                                                                                                                       78.33
                                                                                              77.51 2285.31
77.21 2370.59
                  77.75 2242.67
77.29 2341.07
                                           78.08 2259.07
77.24 2347.63
                                                                     78.02 2275.47
77.48 2357.47
  2239.39
  2318.11
                                           76.86 2423.08
76.7 2554.28
76.17 2613.33
76.07 2655.97
76.23 2754.37
  2396.84
                  76.69 2406.68
                                                                     76.55 2449.32
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76.71 2629.73
                                                                     76.29 2564.12
  2583.81
                  76.58 2600.21
                                                                     76.16 2623.17
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                  76.41 2646.13
76.58 2711.73
                                                                     76.33 2669.09
76.64 2760.93
                                                                                              76.18 2698.61
76.27 2793.74
  2705.17
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                 76.37 2816.7
76.42 2928.22
                                           76.58 2849.5
76.9 2954.46
  2797 02
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                                                                                              76.55 2888.86
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                                                                     76.62 2983.99
                                                                                               76.8 3010.23
  2905.26
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                                           76.66 3065.99
76.3 3177.51
76.85 3289.04
76.8 3361.2
76.45 3472.73
  3036.47
                  77 3052.87
76.57 3144.71
                                                                    76.96 3069.27
76.69 3203.76
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76.72 3226.72
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76.71 3410.41
76.41 3505.53
                                                                     76.49 3302.16
   3246.4
                  76.86 3269.36
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  3348.08
                                                                     76.49 3390.73
  3443.21
                  76.68 3459.61
                                                                     76.59 3492.41
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                  76.41 3561.29
76.57 3722.02
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76.52 3761.38
                                                                     76.49 3623.62
76.57 3823.71
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76.48 3830.27
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  3679.38
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                  76.52 3908.99
76.67 4161.56
                                           76.67 3974.59
76.59 4319.01
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76.48 4332.13
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76.55 4374.78
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  3882.75
  4112.36
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76.5 4535.5
76.31 4630.63
76.23 4817.6
76.81 4965.2
                                           76.27 4505.98
76.4 4617.51
 4433.82
4568.3
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                                                                                               76.3 4558.46
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                 76.43 4466.62
76.25 4587.99
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76.89 4902.88
77 5020.97
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                                           76.38 4784.8
76.29 4909.44
76.97 5030.81
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  4699.51
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  4896.32
5001.29
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                  76.63 5152.17
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                                           76.51 5244.02
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80.82 5430.72
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81.42 5450.32
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79.96 5460.12
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                                                                    76.44 5404.59
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                                                                    81.2 5456.85
74.87 5492.79
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71.77 5584.25
75.75 5623.45
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72 5603.85
78.96 5636.52
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  5541.79
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66.93 5701.85
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                                           69.13 5692.05
  5718.19
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  5894.25
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  6054.51
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79.56 6129.55
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                  79.65 7603.76
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                  78.83 7931.73
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78.51 8049.81
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                                                                                                                        78.27
                 78.42 8144.92
78.07 8262.99
                                           78.19 8177.72
78.23 8299.07
                                                                    78.22 8203.96
78.1 8318.75
                                                                                              78 8243.31
78.32 8335.15
  8112.12
  8253.15
                                                                                                                        78.22
                                           78.17 8440.11
78.72 8571.3
78.6 8620.5
                                                                    78.43 8466.35
78.61 8597.54
                                                                                              78.34 8472.91
78.76 8604.1
  8358 11
                  78.31 8364.67
                                                                                                                        78 55
                  78.45 8545.06
  8489.31
  8610.66
                 79.46 8613.94
                                                                    79.64 8623.78
                                                                                               78.8
                                                                                                       8653.3
                                                                                                                       78.88
                 79.1 8712.34
80.06 8781.21
                                           78.83 8722.18
82.51 8791.05
                                                                    79.11 8741.86
83.81 8814.01
                                                                                             79.12 8754.98
83.98 8823.85
   8768 1
                                                                                                                       82.48
  8830.41
                 80.64 8836.97
                                           79.71 8846.81
                                                                    79.23 8856.65
                                                                                              79.43
Manning's n Values
                                        n Val Sta
.07 5724.72
                                                                                             n Val Sta
.07 6002.31
       Sta n Val Sta
0 .066 5665.92
                                                                   n Val
                                                                      .025 5937.06
                                                                                                                         .085
Bank Sta: Left Right
                                         Lengths: Left Channel
                                                                               Right
                                                                                               Coeff Contr.
                                                                                                                       Expan.
Bank Sta: Lert Right Lengths: .
5665.92 6002.31
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 5665.92 76.18 T
                                          1737.71 1757.01 769.76
2
 0 5665.92 76.18
6002.31 8856.65 85.37
Left Levee Station= 64.94
Right Levee Station= 8814.01
                                                            Elevation=
                                                            Elevation=
                                                                                83.98
CROSS SECTION OUTPUT Profile #Design Flow
                                                                                                                       Channel
                                                                                                                                      Right OB
                                                            Element
                                                            Wt. n-Val.
Reach Len. (ft)
Flow Area (sq ft)
                                              0.03
                                                                                                                     0.044
1757.01
6630.67
   Vel Head (ft)
W.S. Elev (ft)
                                                                                                       0.066
   Crit W.S. (ft)
E.G. Slope (ft/ft)
                                                                                                  22982.93
                                              63.58
                                                            Area (sq ft)
Flow (cfs)
                                   0.000045
                                                                                                                      6630.67
                                                                                                                                     11621.34
   Q Total (cfs)
Top Width (ft)
Vel Total (ft/s)
                                         20000.00
                                                                                                                    11073.93
                                                                                                    8926.07
                                                            Top Width (ft)
Avg. Vel. (ft/s)
Hydr. Depth (ft)
Conv. (cfs)
Wetted Per. (ft)
                                                                                                    5577.29
                                                                                                                       324.30
                                                                                                                                       2694.88
                                           8596.47
                                                                                                        0.39
                                              26.62
                                                                                                                         20.45
   Max Chl Dpth (ft)
                                                                                                         4.12
   Conv. Total (cfs)
Length Wtd. (ft)
                                         2978195.0
                                                                                                    1329178.0
                                                                                                                       1649017.0
                                           1750.75
                                                                                                    5582.33
                                                                                                                       334.54
         Ch El (ft)
                                                             Shear (lb/sq ft
                                                                                                                          0.06
                                                            Stream Power (lb/ft s)
   Alpha
                                               3.53
                                                                                                         0.00
                                                                                                                           0.09
   Frctn Loss (ft)
C & E Loss (ft)
                                               0 15
                                                            Cum Volume (acre-ft)
                                                                                                  15365.61
                                                                                                                    12556.67
                                                                                                                                       9780.79
                                                            Cum SA (acres)
                                                                                                    4530.98
                                                                                                                       684.80
                                                                                                                                       3135.78
```

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Manning's n values were composited to a single value in the main channel.

Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used. Note:

RIVER: Rio Grande REACH: Lower Reach RS: 127.05*

| INPUT
Descripti
Station E | | | num= | 460 | | | | | |
|---------------------------------|-----------------|--------------------|----------------|------------------------|----------------|--------------------|----------------|----------------------|------------------|
| Sta
0 | Elev
81.35 | Sta
17.4 | Elev
82.72 | Sta
39.14 | Elev
86.91 | Sta
43.49 | Elev
87.27 | Sta
49.11 | Elev
86.71 |
| 58.38 | 84.74 | 65.99 | 82.86 | 80.2 | 79.92 | 100.09 | 76.47 | 115.62 | 74.73 |
| 125.67
216.6 | 73.94
72.69 | 134.19
230.81 | 72.38
72.59 | 139.88
250.7 | 72.72
72.74 | 150.53
256.38 | 72.46
72.67 | 185.34
290.48 | 72.35
72.7 |
| 299
421.98 | 72.81
73.41 | 335.94
429.74 | 72.69
73.26 | 352.99
460.77 | 72.76
73.52 | 375.44
491.78 | 73.2
73.38 | 406.99
499.54 | 73.11
73.71 |
| 518.93 | 73.92 | 526.69 | 73.68 | 534.44 | 73.81 | 542.2 | 73.63 | 553.84 | 73.69 |
| 573.23
643.03 | 74.26
79.22 | 588.73
659.9 | 76.27
79.09 | 592.61
665.58 | 76.97
79.39 | 608.12
681.8 | 78.97
78.8 | 634.32
705.07 | 79.05
78.78 |
| 720.59 | 78.98 | 732.22 | 78.81 | 751.61 | 78.87 | 767.88 | 78.63 | 778.75 | 78.31 |
| 786.51
861.66 | 78.49
78.55 | 796.29
867.34 | 78.34
78.68 | 813.35
887.23 | 78.62
78.57 | 830.4
921.33 | 78.42
78.54 | 838.92
930 | 78.54
78.77 |
| 958.27
1054.88 | 78.56 | 972.48
1065.73 | 78.73 | 992.37
1083.31 | | 1009.42
1088.99 | | 1046.36
1100.35 | 78.71
79 |
| 1134.45 | 78.96 | 1148.66 | 78.83 | 1165.71 | 78.91 | 1191.28 | 78.8 | 1225.38 | 78.78 |
| 1248.11
1367.47 | | 1265.16
1378.83 | | 1276.53
1427.14 | | 1327.68
1464.08 | | 1341.07
1489.66 | 78.96
79.19 |
| 1518.07 | 79.16 | 1537.96 | 79.22 | 1552.17 | 79.1 | 1611.84 | 79.33 | 1635.78 | 79.56 |
| 1647.42
1701.72 | | 1665.84
1716.99 | | 1678.45
1739.72 | | 1682.32
1752.12 | | 1693.96
1759.88 | 77.23
74.52 |
| 1782.34
1844.86 | | 1790.87
1861.91 | | 1805.08
1878.96 | | 1810.76
1881.81 | | 1830.65
1884.65 | 73.92
73.9 |
| 1898.86 | 73.98 | 1904.54 | 73.74 | 1918.75 | 73.87 | 1927.27 | 73.59 | 1930.11 | 73.75 |
| 1944.32
2063.67 | 73.71
73.19 | 1958.53
2072.2 | | 1973.17
2086.41 | | 1988.69
2109.14 | | 2040.93
2134.71 | 73.42
73.16 |
| 2140.4 | 73.26 | 2180.18 | 73.4 | 2217.13 | 73.13 | 2225.65 | 73.34 | 2239.86 | 73.11 |
| 2251.22
2299.53 | | 2259.75
2336.47 | 73.44 | 2265.43 2372.6 | | 2279.64 2379.09 | 73.51 | 2288.16
2427.41 | 73.3
73.73 |
| 2455.82
2582.02 | | 2489.92
2632.01 | | 2504.13
2643.38 | | 2523.84
2646.22 | | 2546.75
2668.95 | 74.15
75.01 |
| 2674.63 | 75.13 | 2702.24 | 75.19 | 2729.37 | 75.66 | 2741.01 | 76.09 | 2764.28 | 76.49 |
| 2782.62
2870.71 | | 2799.67
2887.76 | | 2819.56
2899.12 | | 2836.61
2924.71 | | 2853.47
2934.92 | 76.69
76.6 |
| 2969.81 | 77.42 | 2984.38 | 77.32 | 2995.74 | 77.46 | 3012.79 | 77.34 | 3024.16 | 77.46 |
| 3051.26
3225.77 | | 3109.41
3373.69 | 77.4 | 3126.46
3450.7 | 77.34 | 3175.35
3485.6 | 77.42 | 3210.25
3516.63 | 77.4
77.39 |
| 3549.87
3780.33 | | 3594.19
3788.08 | 77.4 | 3679.5
3830.75 | | 3698.89
3856.78 | | 3714.41
3869.52 | 77.55
77.65 |
| 3961.92 | 77.68 | 3998.86 | 77.53 | 4032.4 | 77.68 | 4059.55 | 77.63 | 4071.19 | 77.69 |
| 4109.96
4229.04 | 77.67
78.02 | 4121.6
4234.72 | | 4132.42
4241.82 | 77.71
77.92 | 4160.84
4280.6 | | 4189.25
4300.08 | 78.04
77.91 |
| 4319.97 | 78.09 | 4345.55 | 77.96 | 4382.49 | 78.04 | 4402.38 | 77.87 | 4450.69 | 78.01 |
| 4487.63
4598.45 | | 4490.48
4641.12 | | 4530.26
4660.87 | | 4552.07
4669.36 | | 4559.83
4680.68 | 77.57
78.73 |
| 4686.34
4728.79 | 79.79 | 4692
4745.77 | | 4708.98
4768.41 | | 4714.64
4788.22 | | 4723.13
4796.71 | 77.5
75.25 |
| 4825.01 | 75.33 | 4830.82 | 75.25 | 4844.82 | 76.12 | 4858.97 | 79.05 | 4861.8 | 79.31 |
| 4868.36
4905.54 | 77.77
71.5 | 4874.92
4912.1 | | 4888.05
4923.04 | | 4892.42
4927.42 | 76
63.36 | 4896.8
4939.38 | 75.17
60.35 |
| 4945.84 | 59.86 | 4954.56 | 57.15 | 4958.21 | 56.5882 | 4974.31 | 54.11 | 4994.05 | 53.07 |
| 5002.06
5050.08 | | 5011.38
5058.08 | | 5026.07
5074.09 | | 5034.07
5076.71 | | 5041.5654
5081.95 | 1.73495
59.98 |
| 5089.81
5126.49 | | 5100.29
5136.97 | | 5108.15
5140.01 | 60.57
66.84 | 5113.39
5152.7 | | 5118.63
5168.42 | 61.89
70.57 |
| 5173.66 | | 5179.14 | | 5183.48 | | 5205.23 | | 5209.57 | 78.25 |
| 5218.26
5262.49 | | 5222.62
5301.84 | 81.23
80.73 | 5231.3
5319.47 | 81.73
80.96 | 5244.3
5332.7 | | 5252.09
5341.51 | 81.15
80.01 |
| 5350.84 | 79.85 | 5359.14 | 79.31 | 5369.04 | 79.32 | 5376.83 | 79.09 | 5403.23 | 78.72 |
| 5412.04
5522.25 | 77.84 | 5429.68
5544.3 | 78.33
77.8 | 5439.2
5566.54 | | 5459.99
5592.57 | | 5496.37
5602.98 | 77.44
77.99 |
| 5618.6
5720.63 | | 5636.81
5751.48 | | 5660.25
5769.11 | 77.75
77.34 | 5673.25
5806 | | 5694.17
5816.41 | 77.79
77.46 |
| 5899.7 | 77.02 | 5954.36 | 77.13 | 5959.32 | 77.05 | 6016.82 | 76.79 | 6024.63 | 76.96 |
| 6065.69
6251.08 | | 6110.53
6278.41 | | 6158.76
6287.27 | | 6220.79
6326.56 | | 6229.66
6339.57 | 76.38
76.28 |
| 6380.33 | 76.35 | 6406.92 | 76.26 | 6428.06 | 76.42 | 6443.68 | 76.4 | 6467.11 | 76.54 |
| 6477.52
6588.62 | | 6519.16
6606.35 | | 6529.57
6610.78 | 76.54 | 6557.61
6624.07 | | 6579.75
6637.37 | 76.4
76.45 |
| 6659.71
6823.68 | | 6685.74
6841.91 | | 6730.44
6854.52 | | 6743.74
6863.39 | | 6761.46
6872.25 | 75.74
75.24 |
| 6914.79 | 75.15 | 6930.4 | 75.22 | 6969.44 | 75.21 | 6987.48 | 75.15 | 7045.08 | 75.35 |
| 7053.95
7193.28 | | 7091.77
7235.64 | | 7104.79
7244.51 | | 7133.42
7253.37 | 75.21
76.37 | 7169.18
7257.8 | 75.59
75.7 |
| 7262.23 | 76.21 | 7271.1 | 75.98 | 7279.96 | 76.2 | 7323.42 | 76.33 | 7354.65 | 76.55 |
| 7365.07
7492.6 | | 7383.28
7500.41 | | 7430.13
7516.03 | 75.6 | 7453.56
7531.64 | 77.01
74.71 | 7484.8
7542.05 | 76.99
74.39 |
| 7552.47
7640.96 | | 7565.48
7646.17 | 74.02
73.53 | 7583.7
7659.18 | 74.13
73.16 | 7617.54
7682.6 | | 7627.95
7693.02 | 73.6
73.11 |
| 7739.87 | 73.47 | 7747.67 | 73.42 | 7789.32 | 73.93 | 7810.14 | 74.32 | 7830.96 | 76.33 |
| 7841.38
7916.86 | | 7849.19
7929.87 | 77.4
77.72 | 7870
7932.47 | | 7880.42
7948.09 | | 7896.03
7961.11 | 77.52
79.4 |
| 7971.31 | 79.48 | 7976.72 | 79.02 | 7992.34 | 78.62 | 8010.55 | 79.02 | 8018.36 | 78.89 |
| 8093.84
8272.65 | 78.4 | 8132.89
8285.95 | 78.54 | 8158.91
8325.49 | 78.35 | 8206.19
8335.91 | 78.46 | 8259.36
8361.29 | 78.57
78.47 |
| 8390.56
8497.27 | | 8398.37
8507.69 | | 8421.79
8549.33 | | 8445.22
8560.73 | | 8484.27
8585.77 | 78.32
78.13 |
| 8596.19 | 78.01 | 8635.22 | 78.06 | 8682.07 | 77.98 | 8702.54 | 77.86 | 8737.99 | 77.91 |
| 8746.86
8807.01 | | 8755.72
8817.42 | | 8760.15
8830.43 | | 8769.02
8853.22 | | 8773.45
8893.11 | 77.8
77.69 |
| 8911.12 | 77.91 | 8929.34 | 77.95 | 8937.14 | 78.16 | 8947.56 | | 8957.97 | 79.11 |
| 8968.46
9052.65 | | 8986.17
9064.68 | 79.81 | 8999.46
9075.1 | | 9030.49
9080.29 | | 9043.78
9088.11 | 81.15
81.68 |
| Manning's | n Value | es | num= | 5 | | | | | |
| Sta
0 | n Val | Sta | n Val | | n Val | Sta
5041.56 | n Val
.066 | Sta
5231.3 | n Val
.074 |
| | | | | | | | | | |
| Bank Sta: | Left
861.8 ! | Right
5231.3 | | s: Left (
1737.71 1 | | Right
769.76 | Coefi | Contr. | Expan. |
| Ineffecti | | num= | | L | | | | | |
| 5231.3 | 9088.11 | 81.73 | T | | | a = | | | |
| Left Leve | e 5 | Station= | 43.49 | Ele | evation= | 87.27 | | | |

CROSS SECTION

RIVER: Rio Grande REACH: Lower Reach

RS: 126.7

| Description | | | | elevations | trans | slated | from | IBWC | 2008 | |
|--------------------|------------------|--------------------|----------------|--------------------|-------|------------------|----------|----------------|--------------------|----------------|
| Station El | | ss-sectio | num= | 459 | | | | | | |
| Sta | Elev | Sta | Elev | Sta | Elev | St | a | Elev | Sta | Elev |
| 0 | 83.66 | 12.59 | 85.84 | | 86.77 | 28.3 | | 86.97 | 34.63 | 86.09 |
| 40.93
112.56 | 84.51
67.19 | 69.92
286.38 | 75.2
67.19 | | 73.74 | 83.0
335.5 | | 71.69 | 99.44
342.13 | 68.37
67.72 |
| 348.69 | 67.45 | 374.93 | 67.77 | 401.16 | 67.64 | 407.7 | | 68.25 | 424.12 | 68.66 |
| 430.68 | 68.21 | 437.24 | 68.48 | | 68.16 | 453.6 | | 68.32 | 460.2 | 68.93 |
| 470.04
529.07 | 69.23
79.5 | 483.15
538.91 | 73.24
78.93 | | 74.7 | 499.5
561.8 | | 78.93
78.43 | 522.51
581.54 | 79
78.44 |
| 529.07 | 78.74 | 604.5 | 78.49 | | 78.53 | 643.8 | | 77.28 | 650.41 | 77.75 |
| 666.81 | 77.41 | 676.65 | 77.65 | 693.05 | 77.5 | 699.6 | 51 | 77.65 | 722.56 | 77.5 |
| 735.68 | 77.67 | 768.48 | 77.51 | | 77.67 | 794.7 | | 77.56 | 817.67 | 77.74 |
| 847.19
955.42 | 77.64
77.82 | 883.27
978.37 | 77.73
77.9 | | 77.84 | 919.3 | | 77.8 | 925.9
1057.08 | 78
77.92 |
| 1099.72 | 78.1 | 1119.4 | | 1135.79 | | 1152.1 | | | 1188.27 | 78.22 |
| 1234.18 | | 1260.42 | 78.29 | | | 1306.3 | | | 1342.41 | 78.41 |
| 1368.64 | | 1378.48 | | | | 1404.7 | | 78.79 | 1408 | 77.94 |
| 1417.84
1473.59 | 73.7
68.91 | 1424.4
1486.71 | | | | 1447.3
1519.5 | | | 1467.03
1545.74 | 70.17
69.37 |
| 1575.26 | | 1611.33 | | | | 1653.9 | | | 1667.09 | 69.42 |
| 1690.04 | | 1703.16 | | | | 1791.7 | | | 1821.23 | 70.06 |
| 1847.46
2011.44 | | 1886.82
2044.24 | | | | 1926.1 | | | 1991.77
2119.67 | 70.77
71.66 |
| 2152.47 | | 2168.87 | 71.85 | | 72.14 | 2195. | | 72.33 | 2227.9 | 73.62 |
| 2247.58 | | 2270.54 | | 2277.09 | | 2293.4 | | | 2303.33 | 75.49 |
| 2323.01 | | 2342.69 | | | | 2378.7 | | | 2398.44 | 76.54 |
| 2437.8 | | 2460.76 | | | | 2477.1 | | | 2496.83 | 78.17 |
| 2503.39
2585.38 | | 2516.51
2618.18 | 78.24 | | | 2555.8
2670.6 | | | 2565.71
2700.17 | 78.07
78.28 |
| 2713.29 | 78.15 | 2788.72 | 78.28 | 2795.28 | 78.17 | 2818.2 | 24 | 78.24 | 2844.48 | 78.09 |
| 2867.43 | 78.21 | 2903.51 | 78.12 | 2933.03 | 78.31 | 2959.2 | 27 | 78.21 | 2975.66 | 78.34 |
| 3024.86
3182.28 | | 3097.01
3188.84 | | | | 3126.5
3251.1 | | | 3152.77
3257.71 | 78.55
78.94 |
| 3274.11 | | 3300.35 | | | | 3326.5 | | | 3379.06 | 78.92 |
| 3395.46 | | 3418.42 | | | | 3461.0 | | | 3470.89 | 79.31 |
| 3493.85 | 79 | 3539.77 | 79.06 | 3566 | 79.17 | 3572.5 | 56 | 79.03 | 3605.36 | 79.21 |
| 3621.76
3729.99 | | 3641.44
3769.34 | | | | 3674.2
3821.8 | | | 3713.59
3834.94 | 79.08
79.05 |
| 3841.5 | | 3861.14 | | | | 3910.2 | | | 3933.17 | 78.8 |
| 3975.73 | | 4047.77 | | 4070.68 | 78.5 | 4077.2 | 23 | | 4090.33 | 79.09 |
| 4096.88 | | 4103.42 | 79.55 | | | 4113.2 | | | 4116.52 | 78.12 |
| 4123.07 | | 4129.62
4163.86 | | | | 4139.4 | | | 4143.86
4203.86 | 56.04
51.74 |
| 4153.86
4213.86 | | 4223.86 | | | | 4243.8 | | | 4253.86 | 58.54 |
| 4263.86 | | 4267.13 | | 4273.68 | 63.3 | 4283 | | | 4290.05 | 65.79 |
| 4296.6 | | 4306.42 | | | 64.92 | 4319.5 | | | 4329.34 | 68.94 |
| 4335.89 | | 4342.43 | | | | 4362.0
4411.1 | | | 4381.72
4424.29 | 73.72
76.66 |
| 4388.27
4440.66 | | 4398.09
4457.03 | 77.82 | | | 4470.1 | | | 4476.67 | 77.94 |
| 4486.49 | | 4499.59 | | | | 4529.0 | | 77.88 | 4548.7 | 77.94 |
| 4578.17 | | 4604.36 | | | | 4627.2 | | | 4633.83 | 79 |
| 4643.65 | | 4660.02 | | | | 4709.1 | | | 4722.23 | 79.67 |
| 4748.42
4846.64 | | 4768.07
4869.56 | | | | 4794.2
4899.0 | | | 4810.63
4915.47 | 79.65
79.89 |
| 4928.58 | 80.08 | 4941.7 | | | | 4971.2 | | | 5000.73 | 79.72 |
| 5017.12 | | 5046.64 | 79.71 | | | 5085.9 | | | 5141.74 | 79.23 |
| 5161.41
5279.47 | | 5184.37
5302.42 | | | | 5213.8
5335.2 | | | 5230.28
5354.89 | 79.14
78.68 |
| 5371.29 | 78.91 | 5400.8 | | 5443.43 | | 5449.9 | | | 5459.83 | 78.55 |
| 5541.81 | | 5568.05 | | | 78.04 | 5627.0 | 7 | | 5653.31 | 77.93 |
| 5718.89 | | 5745.13 | | | | 5791.0 | | | 5840.23 | 77.36 |
| 5856.62
5987.8 | | 5866.46
6017.31 | | | 76.87 | 5945.1
6050. | | | 5968.12
6056.66 | 77.13
76.88 |
| 6082.9 | | 6096.01 | | | | 6155.0 | | | 6168.16 | 76.91 |
| 6259.98 | 76.45 | 6266.54 | 76.28 | 6292.77 | 76.13 | 6322.2 | 29 | 75.69 | 6358.36 | 75.29 |
| 6420.66 | | 6466.57 | | | | 6489.5 | | | 6499.37 | 73.94 |
| 6564.95
6689.57 | | 6581.35
6722.36 | | 6601.03
6745.31 | 72 58 | 6617.4 | ±2
15 | | 6650.21
6804.34 | 73.07
72.11 |
| 6820.74 | | 6837.13 | | | | 6883.0 | | | 6932.23 | 72.19 |
| 6938.79 | 72.33 | 7033.89 | 72.7 | 7096.2 | 73.11 | 7135.5 | 55 | 73.74 | 7148.67 | 73.75 |
| 7171.62 | | 7230.65
7319.19 | | | | 7279.8 | | | 7299.52 | 74.74 |
| 7309.35
7351.98 | | 7358.54 | | | | 7384.7 | | | 7345.43
7401.17 | 71.17
69.01 |
| 7404.45 | | 7411.01 | | | 69.16 | 7443 | | | 7466.76 | 68.2 |
| 7479.88 | | 7496.27 | | | | 7519.2 | | | 7532.35 | 67.31 |
| 7548.74 | | 7561.86 | | 7601.21 | | 7620.8 | | | 7630.72 | 68.04 |
| 7660.24
7748.78 | | 7683.19
7758.62 | | | | 7709.4 | | | 7735.66
7784.85 | 73.99
77.59 |
| 7797.97 | | 7817.64 | | | | 7860.2 | | | 7863.55 | 76.18 |
| 7870.11 | | 7883.23 | | | | 7912.7 | | 80.44 | 7919.3 | 79.58 |
| 7925.86 | | 7938.98 | | | | 7961.9 | | | 7971.77 | 79.37 |
| 7984.89
8096.38 | 79.55 | 8060.31
8109.5 | | | | 8076.7
8148.8 | | | 8083.27
8168.53 | 79.27
79.05 |
| 8198.04 | | 8257.07 | 78.89 | 8296.42 | | 8302.9 | | | 8339.05 | 78.78 |
| 8358.73 | 78.58 | 8371.85 | 78.81 | 8381.68 | 78.7 | 8424.3 | 31 | 78.55 | 8440.71 | 78.42 |
| 8450.55 | | 8480.06 | | | | 8503.0 | | | 8509.58 | 78.43 |
| 8542.37
8640.75 | | 8558.77
8647.31 | | | | 8588.2
8686.6 | | | 8604.68
8699.78 | 77.99
77.55 |
| 8716.17 | | 8742.41 | | | | 8768.6 | | | 8807.99 | 77.29 |
| 8814.55 | 77.12 | 8886.7 | 77.06 | 8919.49 | 76.81 | 8952.2 | 28 | 76.74 | 8965.4 | 76.87 |
| 8978.52 | | 8994.91 | | | | 9090.0 | | | 9096.57 | 76.7 |
| 9119.53
9178.55 | | 9129.36
9185.11 | | | 78.85 | 9155.
9263.8 | | | 9162.16
9270.37 | 78.88
79.54 |
| 9290.05 | | 9303.17 | | | | 9319.5 | | 83.94 | - 2.3.37 | |
| | | | | | | | | | | |
| Manning's
Sta | n Value
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| 0 | | 4116.52 | | | | 4273.6 | | .066 | 4460.3 | .074 |
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